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TENTH SESSION.

AUCKLAND, N.Z.
1914.

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(Formerly the Intercolonial Medical Congress of Australasia).

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5th Session, 1899 (Brisbane).	Dr. Scot Skirving, N.S.W.	Dr. W. T. Hayward, S.A. Dr. J. W. Springthorpe, Vic. Dr. E. Jenkins, N.S.W. Dr. Colquhoun, N.Z. Dr. W. G. Maddox.
6th Session, 1902 (Hobart).	Dr. J. Jamieson, Vic.	Dr. Jarvie Hood, N.S.W. Dr. Walter Fell, N.Z. Dr. G. T. Howard, Vic. Dr. H. Swift, S.A. Dr. P. Bancroft, Q. Dr. T. H. Lovegrove, W.A.
7th Session, 1905 (Adelaide).	Dr. Colquhoun, N.Z.	Dr. G. E. Rennie, N.S.W. Dr. D. Grant, Vic. Dr. A. J. Turner, Q. Dr. H. Astles, W.A. Dr. R. R. Wislaw, Tas. Dr. W. Fell, N.Z.
8th Session, 1908 (Melbourne).	Dr. G. E. Rennie, N.S.W.	Dr. E. Roberton, N.Z. Dr. R. H. Martin, S.A. Dr. P. Bancroft, Q. Dr. Gregory Sprott, Tas.
9th Session, 1911 (Sydney).	Dr. W. T. Hayward, S.A.	Dr. H. C. Maudsley, Vic. Dr. J. G. Wolfhagen, Tas. Dr. T. L. Anderson, W.A. Dr. F. Goulburn Gibson, N.Z.
10th Session, 1914 (Auckland, N.Z.).	Dr. Sinclair Gillies, N.S.W.	Dr. T. L. Anderson, W.A. Dr. A. G. Butler, Q. Dr. C. Purser, N.S.W. Dr. C. H. Reissmann, W.A. Dr. G. Sprott, Tas. Dr. R. R. Stawell, Vic.

SURGERY.

	Presidents.	*Vice-Presidents.*
1st Session, 1887 (Adelaide).	Dr. T. N. Fitzgerald, Vic.	Nil.
2nd Session, 1889 (Melbourne).	Dr. E. C. Stirling, S.A.	Dr. C. H. Haines, N.Z. Dr. H. W. Maunsell, N.Z. Dr. Richard Rendle, Q.
3rd Session, 1892 (Sydney).	Dr. W. Gardener	Dr. J. W. Barrett, Vic. Dr. W. E. Collins, N.Z. Dr. F. A. Bowen, Vic. Dr. F. D. Bird, Vic. Dr. C. S. Ryan, Vic. Dr. Hardie, Q. Dr. A. Jamieson, W.A. Dr. J. Thomson, Q.
4th Session, 1896 (New Zealand).	Dr. H. M. O'Hara, Vic.	Dr. A. MacCormick, N.S.W. Dr. W. A. Giles, S.A. Dr. J. Thomson, Q. Dr. S. Knaggs, N.S.W. Dr. Jas. Jackson, Vic.
5th Session, 1899 (Queensland).	Dr. A. MacCormick, N.S.W.	Dr. W. A. Giles, S.A. Dr. W. Moore, Vic. Dr. C. Clubbe, N.S.W. Dr. G. Cleghorn, N.Z. Dr. R. S. Bright, Tas.
6th Session, 1902 (Tasmania).	Dr. L. E. Barnett, N.Z.	Dr. W. Chisholm, N.S.W. Dr. G. A. Syme, Vic. Dr. Hope Lewis, N.Z. Dr. F. Tratman, W.A. Dr. G. H. Hopkins, Q. Dr. B. Poulton, S.A.
7th Session, 1905 (Adelaide).	Dr. F. D. Bird, Vic.	Dr. H. C. Hinder, N.S.W. Dr. R. H. Russell, Vic. Dr. E. Jackson, Q. Dr. F. Tratman, W.A. Dr. R. G. Scott, Tas. Dr. W. E. Collins, N.Z.
8th Session, 1908 (Melbourne).	Dr. B. Poulton, S.A.	Dr. H. C. Hinder, N.S.W Dr. E. S. Jackson, Q. Dr. W. Trethowan, W. A Dr. John Ramsay, Tas.
9th Session, 1911 (Sydney).	Dr. G. A. Syme, Vic.	Dr W. Anstey Giles, S.A. Dr. T. C. Savage, N.Z. Dr. F. H. V. Voss, Q. Dr. George E. Clemons, Tas.
10th Session, 1914 (Auckland, N.Z.).	Dr. R. H. Russell, Vic.	Dr. G. Craig, N.S.W. Dr. W. A. Giles, S.A. Dr. E. S. Jackson, Q. Dr. C. Parker, Tas. Dr. R. A. Stirling, Vic.

OBSTETRICS AND GYNAECOLOGY.

	Presidents.	*Vice-Presidents.*
1st Session, 1887 (Adelaide).	Dr. J. Foreman, N.S.W.	Nil.
2nd Session, 1889 (Melbourne).	Dr. F. C. Batchelor, N.Z.	Dr. R. S. Bright, Tas. Dr. Jas. Hill, Q. Dr. E. W. Way, S.A.

OBSTETRICS AND GYNAECOLOGY—*continued.*

	Presidents.	*Vice-Presidents.*
3rd Session, 1892 (Sydney).	Dr. W. Balls Headley, Vic.	Dr. F. C. Batchelor, N.Z. Dr. R. D. Pinnock, Vic. Dr. R. S. Bright, Tas. Dr. E. Hinchcliffe, Vic. Dr. E. W. Way, S.A.
4th Session, 1896 (New Zealand).	Dr. E. W. Way, S.A.	Dr. R. S. Bryant, Tas. Dr. F. H. Meyer, Vic. Dr. Ralph Worrall, N.S.W. Dr. C. F. Marks, Q.
5th Session, 1899 (Brisbane).	Dr. W. W. O'Sullivan, Vic.	Dr. A. A. Hamilton, S.A. Dr. J. A. G. Hamilton, S.A. Dr. G. R. Adam, Vic. Dr. E. T. Thring, N.S.W. Dr. T. M. Hocken, N.Z. Dr. J. E. Wolfhagen, Tas.
6th Session, 1902 (Tasmania).	Dr. R. Worrall, N.S.W.	Dr. H. C. Taylor Young, N.S.W. Dr. F. W. W. Morton, Vic. Dr. A. F. Davenport, Vic. Dr. A. J. H. Saw, W.A. Dr. F. G. Connolly, Q.
7th Session, 1905 (Adelaide).	Dr. W. S. Byrne, Q.	Dr. E. T. Thring, N.S.W. Dr. G. R. Adam, Vic. Dr. T. G. Connolly, Q. Dr. H. Horrocks, W.A. Dr. C. J. Pike, Tas. Dr. B. Moorehouse, N.Z.
8th Session, 1908 (Melbourne).	Dr. E. Thring, N.S.W.	Dr. Jas. A. G. Hamilton, S.A. Dr. H. F. Harvey, W.A. Dr. F. G. Connolly, Q. Dr. B. M. Moorehouse, N.Z.
9th Session, 1911 (Sydney).	Dr. G. Rothwell Adam, Vic.	Dr. J. A. G. Hamilton, S.A. Dr. D. Hardie, Q. Dr. Felix Meyer, Vic. Dr. B. M. Moorehouse, N.Z.
10th Session, 1914 (Auckland, N.Z.).	Sir D. Hardie, Q.	Dr. F. Barrington, N.S.W. Dr. J. A. B. Hamilton, S.A. Dr. F. Meyer, Vic. Dr. T. Young, N.S.W.

ANATOMY AND PHYSIOLOGY.

	Presidents.	*Vice-Presidents.*
1st Session, 1889 (Adelaide).	Nil.	Nil.
2nd Session, 1889 (Melbourne).	Prof. Stuart, N.S.W. Baron Von Mueller, Pharmacology.	Prof. Watson, S.A.
3rd Session, 1892 (Sydney).	Prof. H. B. Allen, Vic.	Prof. Watson, S.A. Prof. Scott, N.Z. Prof. Spencer, Vic. Dr. J. Lockhart Gibson, Q. Dr. E. C. Stirling, S.A.
4th Session, 1896 (New Zealand).	Prof. Watson, S.A.	Dr. J. W. Barrett, Vic. Dr. E. Hirschfeld, Q. Dr. W. L. Cleland, S.A. Dr. H. Maudsley, Vic. Prof. J. T. Wilson, N.S.W.

ANATOMY AND PHYSIOLOGY—*continued,*

	Presidents.	*Vice-Presidents.*
5th Session, 1899 (Brisbane).	Dr. R. H. Marten.	Prof. C. J. Martin, N.S.W. Prof. J. T. Wilson, N.S.W. Dr. W. S. W. Roberts, N.Z. Dr. G. H. Hogg, Tas.
6th Session, 1902 (Tasmania).	Prof. J. H. Scott, N.Z.	Dr. Sydney Jamieson, N.S.W. Dr. Ed. Jennings, N.Z. Dr. J. A. Wheeler, Q. Dr. W. R. Cavenagh-Mainwaring, S.A. Dr. W. P. Seed, W.A.
7th Session, 1905 (Adelaide).	Prof. Welsh, N.S.W.	Prof. J. T. Wilson, N.S.W. Dr. C. H. Mollison, Vic. Dr. J. A. Wheeler, Q. Dr. W. Trethowan, W.A. Dr. A. H. Clarke, Tas. Dr. W. S. Roberts, N.Z.
8th Session, 1908 (Melbourne).	Prof. Wilson, N.S.W.	Prof. Stuart, N.S.W. Prof. Watson, S.A. Prof. Malcolm, N.Z.
9th Session, 1911 (Sydney).	Dr. E. H. Embley, Vic.	Dr. W. A. Osborne, Vic. Prof. R. J. A Berry, Vic Prof. J. H. Scott, N.Z.

PATHOLOGY AND BACTERIOLOGY

	Presidents.	*Vice-Presidents.*
2nd Session, 1889 (Melbourne).	Dr. W. C. Wilkinson, N.S.W.	Nil.
3rd Session, 1892 (Sydney).	Prof. Allen, Vic.	Nil.
4th Session, 1896 (New Zealand).	Prof. Watson, S.A.	Nil.
6th Session, 1902 (Hobart).	Prof. J. H. Scott, N.Z.	Nil.
8th Session, 1908 (Melbourne).	Dr. F. Tidswell, N.S.W.	Dr. W. R. Cavenagh-Mainwaring, S.A. Dr. W. S. Roberts, N.Z. Dr. W. W. Love, Q.
9th Session, 1911 (Sydney).	Dr. Wilton W. Love, Q.	Dr. A. Breinl, Q. Dr. W. W. Roberts, N.Z. Dr. R. J. Bull, Vic. Dr. W. R. Cavenagh-Mainwaring, S.A.
10th Session, 1914 (Auckland, N.Z.).	Prof. Welsh, N.S.W.	Dr. R. J. Bull, Vic. Dr. C. T. de Crespigny, S.A. Dr. J. F. Flashman, N.S.W. Dr.

PUBLIC HEALTH AND STATE MEDICINE.

	Presidents.	*Vice-Presidents.*
1st Session, 1887 (Adelaide).	Nil.	Nil.
2nd Session, 1889 (Melbourne).	Dr. H. N. MacLaurin, N.S.W.	Dr. Alex. Johnson, N.Z. Dr. Thos. C. Smart, Tas. Dr. Alfred R. Waylen, W.A

PUBLIC HEALTH AND STATE MEDICINE—*continued.*

	Presidents.	*Vice-Presidents.*
3rd Session, 1892 (Sydney).	Dr. H. T. Whittell, S.A.	Dr. D. A. Gresswell, Vic. Dr. D. Macgregor, N.Z. Dr. F. Ogston, N.Z. Dr. J. V. McCreery, Vic. Dr. W. F. Taylor, Q. Dr. C. E. Barnard, Tas. Dr. W. H. McFarland, Tas. Dr. A. R. Waylen, W.A.
4th Session, 1896 (New Zealand).	Dr. J. W. Springthorpe, Vic.	Dr. W. H. Goode, N.S.W. Dr. D. Hardie, Q. Dr. J. E. Neild, Vic. Dr. C. Ross, N.S.W.
5th Session, 1899 (Brisbane).	Dr. J. A. Thompson, N.S.W.	Dr. T. Borthwick, S.A. Dr. J. V. McCreery, Vic. Dr. Eric Sinclair, N.S.W. Dr. F. Ogston, N.Z. Dr. T. Hope Lewis, N.Z. Dr. E. J. Crouch, Tas.
6th Session, 1902 (Hobart).	Dr. Thos. Cherry, Vic.	Dr. F. Tidswell, N.S.W. Dr. B. B. Ham, Q. Dr. A. C. F. Halford, Q. Dr. T. M. Kendall, N.S.W. Dr. J. V. McCreery, Vic.
7th Session, 1905 (Adelaide).	Dr. W. G. Armstrong, N.S.W.	Dr. F. Tidswell, N.S.W. Dr. W. B. Smith, Vic. Dr. B. B. Ham, Q. Dr. E. Black, W.A. Dr. G. F. Read, Tas. Dr. J. N. Mason, N.Z.
8th Session, 1908 (Melbourne).	Dr. J. N. Mason, N.Z.	Dr. T. Borthwick, S.A. Dr. B. B. Ham, Q. Dr. J. S. C. Elkington, Tas.
9th Session, 1911 (Sydney).	Dr. J. S. Purdy, Tas.	Dr. B. Burnet Ham, Vic. Dr. T. Borthwick, S.A. Dr. J. H. L. Cumpston, Vic.
10th Session, 1914 (Auckland, N.Z.).	Dr. J. S. C. Elkington.	Dr. T. Borthwick, S.A. Dr. F. Tidswell, N.S.W. Dr. C. S. Willis, N.S.W.

STATE MEDICINE.

	Presidents.	*Vice-Presidents.*
1st Session, 1887 (Adelaide).	Dr. H. T. Whittell, S.A.	Nil.
7th Session, 1905 (Adelaide).	Dr. G. A. Syme, Vic.	Sir P. S. Jones, N.S.W. Dr. And. Shields, Vic. Hon. Dr. C. F. Marks, Q. Dr. T. G. Davy, W.A. Dr. F. Ogston, N.Z.

EYE, EAR, AND THROAT.

	Presidents.	*Vice-Presidents.*
1st Session, 1887 (Adelaide).	Nil.	Nil.
2nd Session, 1889 (Melbourne).	Dr. M. J. Symons.	Dr. C. M. Anderson, N.Z. Dr. A. J. Brady, N.S.W. Dr. Thos. Evans, N.S.W.
3rd Session, 1892 (Sydney).	Nil.	Nil.

EYE, EAR, AND THROAT—*continued.*

	Presidents.	*Vice-Presidents.*
4th Session, 1896 (New Zealand).	Dr. H. M. O'Hara, Vic. Dr. Jas. Jackson, Chairman, Vic.	Dr. Jas. Jackson, Vic.
5th Session, 1899 (Brisbane).	Dr. H. L. Ferguson, N.Z.	Dr. T. K. Hamilton, S.A. Dr. A. L. Kenny, Vic. Dr. A. J. Brady, N.S.W. Dr. W. Odillo Maher, N.S.W. Dr. F. Wallace Mackenzie, N.Z. Dr. C. E. Barnard, Tas.
6th Session, 1902 (Hobart).	Dr. T. K. Hamilton, S.A.	Dr. T. S. Kirkland, N.S.W. Dr. C. M. Iredale, Vic. Dr. W. M. Stenhouse, N.Z. Dr. E. L. Gault, Vic. Dr. A. Francis, Vic. Dr. Hy. T. Kelsall, W.A.
7th Session, 1905 (Adelaide).	Dr. A. J. Brady, N.S.W. Dr. Odillo Maher, N.S.W.	Dr. G. T. Hankins, N.S.W. Dr. P. S. Webster, Vic. Dr. J. L. Gibson, Q. Dr. H. T. Kelsall, W.A. Dr. W. W. Giblin, Tas. Dr. H. L. Ferguson, N.Z.
8th Session, 1908 (Melbourne).	Dr. J. Lockhart Gibson, Q.	Dr. F. A. Pockley, N.S.W. Dr. G. H. Hogg, Tas. Dr. G. M. Scott, W.A.

OPHTHALMOLOGY.

	Presidents.	*Vice-Presidents.*
9th Session, 1911 (Sydney).	Dr. J. W. Barrett, Vic.	Dr. C. F. G. Webster, N.Z. Dr. A. M. Morgan, S.A. Dr. A. E. Martin, W.A.
10th Session, 1914 (Auckland, N.Z.).	Dr. F. A. Pockley, N.S.W.	Dr. C. W. Hamilton, S.A. Dr. A. L. Kenny, Vic. Dr. R. Thompson, Q.

NEUROLOGY.

	Presidents.	*Vice-Presidents.*
2nd Session, 1889 (Melbourne).	Dr. F. N. Manning, N.S.W.	Dr. W. E. Hacon, N.Z. Dr. A. S. Paterson, S.A. Dr. R. R. Scholes, Q.
8th Session, 1908 (Melbourne).	Dr. Eric Sinclair, N.S.W.	Dr. W. L. Cleland, S.A. Dr. J. B. Hogg, Q. Dr. Chisholm Ross, N.S.W.
9th Session, 1911 (Sydney).	Dr. W. Beattie Smith, Vic.	Dr. W. Ernest Jones, Vic. Dr. W. H. Macfarlane, Tas. Dr. S. H. R. Montgomery, W.A. Dr. J. F. S. Hay, N.Z.
10th Session, 1914 (Auckland, N.Z.).	Dr. C. Ross, N.S.W.	Dr. A. Davidson, N.S.W. Dr. M. H. Downey, S.A. Dr. E. Jones, Vic.

DISEASES OF CHILDREN.

	Presidents.	*Vice-Presidents.*
2nd Session, 1889 (Melbourne).	Dr. W. Snowball.	Nil.
8th Session, 1908 (Melbourne).	Dr. A. J. Turner, Q.	Dr. C. B. Clubbe, N.S.W. Dr. A. A. Lendon, S.A. Dr. A. E. Mills, N.S.W.
9th Session, 1911 (Sydney).	Dr. A. Jeffreys Wood, Vic.	Dr. C. H. Officer, W.A. Dr. P. B. Bennie, Vic. Dr. R. D. Campbell, Tas.
10th Session, 1914 (Auckland, N.Z.).	Dr. C. P. B. Clubbe, N.S.W.	Dr. G. E. Clemons, Tas. Dr. J. M. Gill, N.S.W. Dr. F. H. Cole, Vic.

NAVAL AND MILITARY—MEDICINE AND SURGERY.

	Presidents.	*Vice-Presidents.*
8th Session, 1908 (Melbourne).	Surg.-Gen. Williams.	Col. J. Thomson, Q. Lt.-Col. Fiaschi, N.S.W. Lt.-Col. Lautour, N.Z. Major W. Giblin, Tas.
9th Session, 1911 (Sydney).	Col. James R. Purdy, N.Z.	Lt.-Col. A. Sutton, Q. Major A. F. White, W.A.
10th Session, 1914 (Auckland, N.Z.).	Col. Chas. Ryan, Vic.	Lt.-Col. W. L'Estrange Eames, Q. Lt.-Col. R. H. J. Fetherstone, Vic. Lt.-Col. T. Fiaschi, N.S.W. Dr. A. Sutton, Q.

SKIN, RADIO-THERAPATHY, ETC.

	Presidents.	*Vice-Presidents.*
2nd Session, 1899 (Melbourne).	Dr. J. P. Ryan.	Nil.
8th Session, 1902 (Melbourne).	Dr. McMurray, N.S.W.	Dr. H. Herschel Harris, N.S.W. Dr. W. P. Seed, W.A. Dr. E. J. Roberts, Tas.
9th Session, 1911 (Sydney).	Dr. H. F. Lawrence, Vic. Dr. F. J. Clendinnen, Vic.	Dr. E. W. J. Ireland, Tas. Dr. John Cuthbert, W.A.
10th Session, 1914 (Auckland, N.Z.).	Dr. H. Harris, N.S.W.	Dr. A. Noyes, Vic. Dr. E. W. J. Ireland, Vic. Dr. G. W. Armstrong, Vic. Dr. Crowley.

LARYNCOLOGY, RHINOLOGY, AND OTOLOGY.

	Presidents.	*Vice-Presidents.*
9th Session, 1911 (Sydney).	Dr. W. N. Robertson, Q.	Dr. C. L. M. Iredale, Vic. Dr. G. A. Fischer, S.A. Dr. D. H. Lines, Tas.
10th Session, 1914 (Auckland, N.Z.).	Dr. H. R. Nolan, N.S.W.	Dr. S. A. Ewing, Vic. Dr. G. S. L'Estrange, Q. Dr. R. H. Puelleine, S.A.

LIST OF MEMBERS OF CONGRESS.

NEW SOUTH WALES.

Arthur, Richard	Sydney.
Barrington, Fourness	,,
Baur, F. George	Newcastle.
Bean, H. K.	Wallsend.
Bevan, Sybil C.	Sydney.
Blackburn, C. B.	,,
Brennan, J. McD.	Cootamundra.
Buckley, E. W.	Tamworth.
Burgess, T. W. W.	Wagga Wagga.
Cahill, A. J.	Lismore.
Carruthers, C. U.	Sydney.
Clelland, J. B.	,,
Craig, Gordon	,,
Dansey, —	Strathfield.
Davis, Neville	Bullahdelah.
De Garis, Mary C.	Tibooburra.
Dick, J. A.	Sydney.
Dixson, Storie	,,
Dunn, —	,,
Eames, Wm. L'Estrange	Newcastle.
Ferguson, E. W.	Sydney.
Fiaschi, P.	,,
Fiaschi, T.	,,
Florance, E.	Cootamundra.
Gillies, Sinclair	Sydney.
Harris, Herschell	,,
Harvey, L. Watson	,,
wlHoe, W. Cresswell	Bega.
Jamieson, Sydney	Sydney.
Kelty, Wm.	,,
Lee, H. E.	,,
Lester, C. E.	Mudgee.
Lipscombe, W. T.	Sydney.
Litchfield, W. F.	,,
McClelland, R. E.	,,
McCulloch, S. H.	,,
McMurray, W.	,,
McVittie, John	Coonamble.
Mills, Arthur	Sydney.
Moran, H. M.	,,
Nash, J. B.	,,
Newton, J.	,,
Page, Earle	South Grafton
Paton, R. T.	Sydney.
Pentland, Alex.	Singleton.
Pockley, Antill	Sydney.
Purchas, H. M.	Young.
Purser, Cecil	Sydney.
Read, Clarence	,,
Ross, Chisholm	,,
Roth, Reuter	,,
Thomas, David	,,
Willis, C. S.	,,
Worrall, Ralph	,,
Young, Taylor	,,

NEW ZEALAND.

Abbott, Wm.	Auckland.
Ackland, H. T. D.	Christchurch.
Addison, S. A.	Auckland.
Aicken, Casement	,,
Ardagh, P. A.	Temuka.
Aubin, E. D.	Auckland.
Baker, E. S.	Te Kopuru.
Barclay, W. J.	Invercargill.
Barcroft, P. L.	Hastings.
Barnett, L. E.	Dunedin.
Barr, Hugh	Alexandra South.
Barron, R. S.	Opunake.
Batchelor, F. S.	Dunedin.
Bathgate, W. I.	,,
Baxter, W. Whittington	Rotorua
Bedford, Robert	Auckland
Beattie, R. M.	Avondale.
Begg, C. M.	Wellington.
Bennett, Agnes L.	,,
Bennett, H. C. P.	Devonport.
Bennett, L. E.	Dunedin.
Bertram, H.	Rotorua.
Bewes, E. A.	Tauranga.
Bey, W.	Greytown.
Boyd, James	Auckland.
Boyd, R. J.	Taihape.
Brewis, A. S.	Hamilton.
Briffault, R.	Auckland.
Brookfield, A. W.	Papakura.
Bronte, A.	Pukekohe.
Brown, J. Falconer	Auckland.
Bruce, W.	Onehunga.
Buck, P. H.	Ohaeawai.
Bull, S. A.	Auckland.
Cameron, Percival D.	Dunedin.
Cawkwell, G. L.	Auckland.
Champtaloup, S. T.	Dunedin.
Cheesman, H. Hilton	Tuakau.
Christie, J. M.	Wellington.
Clark, A.	Auckland.
Coldicutt, Claude	,,
Collins, W. E.	Wellington.
Cooke, James	Lincoln.
Crawford, S.	Marton.
Crooke, T. Leslie	Christchurch.
Crosby, H. P.	Tokanui.
Davis, C. S.	Waipiro Bay.
Dawson, —	Wellington.
Douglas, Alex.	Oamaru.
Douglas, H.	Waikato.
Downes, James B.	Christchurch.
Dudley, B. J.	Auckland.
Elliott, J. S.	Wellington.
Endletsberger, T.	Auckland.
Fairclough, W. A.	,,
Fenwick, George	,,
Fenwick, P. C.	Christchurch.
Ferguson, Lindo	Dunedin.
Ferguson, W. Drummond	Auckland.
Forrest, G.	East Oxford.
Gibbs, H. E.	Wellington.
Gibbs, Sidney A.	Nelson.
Gillon, G. Gore	Auckland.
Goldstein, H. M.	,,
Gordon, C. Huntly	Riverton.
Gordon, F. W.	Auckland.
Gordon, Kenneth	Te Aroha.
Gow, Peter	Winton.
Grant, A. McGregor	Auckland.
Grant, N. McKay	,,
Gray, T. G.	,,
Gunn, Elizabeth C.	Wellington.
Guthrie, T. E.	Feilding.
Hallen, A. H.	Clevedon.
Harty, G. W.	Wellington.
Hatherly, Henry R.	Wanganui.
Hay, Frank	Wellington.
Henderson, A.	Te Awamutu.
Henley, E. A. W.	Napier.
Hislop, P. W.	Geraldine.
Hogg, K. H.	Invercargill.
Holmes, Matthew	Wellington.
Hope, J. M.	Auckland.
Horsley, A. J.	,,
Hosking, W. H.	Masterton.
Houghton, R. N.	Auckland.
Hurst, L. Frazer	Whangarei.
Hutson, H.	Wanganui.

ADDENDA TO SOUTH AUSTRALIAN LIST.

Corbin, J.
Crespigny, C. T. C.
Cudmore, A. M.
Gault, A. H.
Gunson, J. B.
Lendon, A. A.
Lynch, A. F.
Morten, R. H.
Newland, H. S.
Niesche, F. W.
Poulton, B.
Rishbeith, H.
Russell, E. A. H.
Scott, F. S.
Smith, W. R.
Stirling, E. C.
Swift, H.
Todd, C. E.
Verco, J. C.
Verco, W. A.

LIST OF MEMBERS OF CONGRESS—*continued.*

NEW ZEALAND—*continued.*

Hyde, J. M.	Waihi.
Inglis, F. Otto	Te Aroha.
Inglis, Tracy	Auckland.
Innes, C. B.	Wanganui.
Irving, W.	Christchurch.
Johnston, W. D. S.	Nelson.
Jones, H. O.	Auckland.
Keller, Florence	,,
Keller, P. M.	,,
Kenny, G. G.	Te Aroha.
Kinder, A.	Auckland.
Lapraik, G.	Thames.
Leahy, J. P. D.	Napier.
Leeper, B. C. A.	Otorohanga.
Levinge, E. G.	Christchurch.
Lewis, T. Hope	Auckland.
Lindsay, P. A.	,,
Line, L. A.	Sumner.
Little, C. T.	Waikari.
Loughnan, J. R.	Timaru.
Lumsden, Fred. W.	Matiere.
McCutcheon, A. B.	Auckland.
Macdonald, E. H. B.	Otahuhu.
McDougall, N.	Auckland.
McDowell, W.	,,
McGhie, John	Devonport.
McKelvey, A. N.	Auckland.
McKenzie, K.	,,
Maguire, C. E.	,,
Marchant, E. L.	Wellington.
Marchesini, G.	Auckland.
Marsack, A. E.	,,
Mason, J. M.	Wellington.
Meinhold, Max	Helensville.
Mercer, W. B.	Kaeo.
Mickle, A. F. J.	Christchurch.
Mickle, A. F.	Auckland.
Moir, P.	,,
Milsom, E. H. B.	,,
Moore, Stuart A.	Dunedin.
Moore, T. C.	Napier.
Morrice, C. G.	Greymouth.
Murray, D. N. W.	Auckland.
Neil, James Hardie	,,
Newell, J. A.	Lyttelton.
Osborne, G. M. H.	Opotiki.
Pabst, J. C.	Auckland.
Parkes, W. H.	,,
Paterson, Ada G.	Dunedin.
Paterson, C. A.	Pleasant Point.
Paterson, W. Fergus	Geraldine.
Pemberton, C. A.	Christchurch.
Phillips, —	Kumara.
Phippen, Harry G.	Raurimu.
Pollen, Henry	Wellington.
Porritt, E.	Wanganui.
Prior, —	Masterton.
Purchas, A. C.	Auckland.
Purdy, J. R.	Wellington.
Reece, Charles L.	Hamilton.
Riley, F. R.	Dunedin.
Roberts, E. E.	Cambridge.
Roberton, E.	Auckland.
Robertson, C. H.	,,
Rossiter, Charles B.	,,
Rowley, C.	Otahuhu.
Russell, G. Graham	Waipu.
Savage, T. Copeland	Auckland.
Scott, G. M.	Marton.
Scott, Jessie A.	Auckland.
Scott, W. G.	Onehunga.
Sharman, E. W. S.	Auckland.
Somerville, J.	,,
Spedding, L. A.	,,
Stapley, W.	Cambridge.
Stenhouse, Andrew	Balclutha.
Steven, D.	Stratford.
Stout, D.	Wellington.
Stout, R.	,,
Stowe, W. Reginald	Palmerston North.
Stride, S. A.	Auckland.
Sweet, G. Bruton	,,
Telford, T. F.	Blackball.
Tewsley, C. H.	Auckland.
Tolhurst, A. M.	Wellington.
Tosswill, J. C.	Hastings.
Usher, V. F.	Auckland.
Unwin, W. H.	Timaru.
Walker, George	Whangarei.
Walshe, D. B.	Thames.
Walton, R. H.	Auckland.
Washbourn, H. E. A.	Nelson.
Wheeler, C. H.	Clevedon.
Whitton, James	Oamaru.
Williams, J. W.	Gisborne.
Williams, W. E.	Auckland.
Wilson, A.	Wanganui.
Wilson, H. M.	Hastings.
Wohlmann, A. S.	Rotorua.
Young, James	Invercargill.

QUEENSLAND.

Ahearne, J.	Townsville.
Butler, A. Graham	Brisbane.
Cameron, J. A.	Ipswich.
Cooper, Lilian V.	Brisbane.
Dods, J. Espie	,,
Garde, H. C.	Maryborough.
Gibson, J. Lockhart	Brisbane.
Hardie, David	,,
Hawkes, C. S.	,,
Jackson, E. Sandford	,,
L'Estrange, G. S.	,,
Love, Wilton	Brisbane.
McDonnell, A. J.	Toowoomba.
Nicoll, J. R.	,,
Richards, S. J.	Mount Morgan.
Robertson, W. N.	Brisbane.
Stewart, A.	Dalby.
Stuart, A.	Rockhampton.
Sutton, Alfred	Brisbane.
Sweet, Elizabeth M.	,,
Taylor, W. F.	,,
Thompson, Robert	,,

SOUTH AUSTRALIA.

Birks, Melville	Adelaide.
Cooper, C. T.	Norwood.
Farries, J. S.	Brighton.
Fooks, E. V. Russell	Adelaide.
Giles, W. Anstey	,,
Hamilton, C. W.	,,
Hamilton, J. A. G.	,,
Hayward, Lionel	Loxton.
Hayward, W. T.	Norwood.
Jermyn, F.	Mount Gambier.
Leitch, O.	Port Pirie.
Morris, E. W.	Semaphore.
Pulleine, R. H.	Adelaide.
Reissman, C.	,,
Symons, M. J.	,,
Watson, Professor A.	,,
Wells, C. V.	,,

LIST OF MEMBERS OF CONGRESS—*continued.*

TASMANIA.

Hamilton, A. J.	Queenstown.
Hogg, G. H.	Launceston.
Lines, D. H. E.	Hobart.
Love, J.	Gormanstown.
Sprott, G.	Hobart.
Webster, L. Clarke	Launceston.
Wolfhagen, J. E.	Hobart.

VICTORIA.

Adam, G. Rothwell	Melbourne.
Adey, John K.	Sunbury.
Allen, Sir H. Brookes	Melbourne.
Armstrong, G. W.	,,
Bage, Charles	,,
Balfour, L. J.	Hawthorn.
Barrett, J. W.	Melbourne.
Blakie, J. L.	Surrey Hills.
Cole, F. Hobill	Carlton.
Connor, S.	Coleraine.
Cuscaden, George	Melbourne.
Dane, Paul G.	Ballarat East.
Donaldson, J. B.	Linton.
Ewing, S. A.	Melbourne.
Gamble, M.	Kew.
Godfrey, C. G.	Brunswick.
Greig, Jane S.	Melbourne.
Harkin, C. F.	Chiltern.
Hewlett, Herbert H.	Fitzroy.
Hornabrook, R. W.	Melbourne.
Howard, G. T.	,,
Howard, H.	St. Kilda.
Horne, George	Melbourne.
Jones, W. Ernest	,,
Joske, A. S.	Macedon.
Kenny, A. L.	Melbourne.
Lind, W. A. T.	Kew.
Loughrey, Bernard	Hawthorne.
McArthur, A. Norman	Melbourne.
McInerny, J.	North Fitzroy.
Mitchell, James T.	Ballarat.
Mitchell, L. J.	Melbourne.
Morton, F. W.	,,
Nyulasy, F. A.	Toorak.
Officer, D. M.	Melbourne.
Orr, W. F.	,,
Rabl, Heinrich	Murtoa.
Reid, R. G.	Elsternwich.
Ruddle, R. G.	Daylesford.
Russell, R. Hamilton	Melbourne.
Ryan, T. F.	Nhill.
Sawrey, E. R.	Melbourne.
Scott, Robert	Ballarat.
Smith, Beattie	Melbourne.
Springthorpe, J. W.	,,
Stawell, R. R.	,,
Stirling, R. A.	,,
Sutherland, B. M.	Moonee Ponds.
Sutton, Harvey	Melbourne.
Syme, G. A.	,,
Turnbull, H. Hume	,,
Webb, J. R.	Footscray.
Webster, P.	Melbourne.
Wood, A. J.	,,
Yule, J. Sandison	,,

WESTERN AUSTRALIA.

Atkinson, E.	Perth.
Arkle, J. Vera	Kalgoorlie.
Hill, Charles	Laveston.
Martin, A.	Perth.
Nethowan, William	,,
Nyulasy, A. J.	Perth.
Officer, E. A.	,,
Saunders, J. H.	,,
Saw, Athelstan J. H.	,,

Harper Philip	Fiji.
Mitchell, J. F.	Aberdeen.

HONORARY MEMBERS OF CONGRESS.

Professor F. D. Brown, Auckland University College.
Professor A. P. W. Thomas, Auckland University College.
Professor H. W. Segar, Auckland University College.
Chancellor of the Otago University.
Professor Pickerill, Professor of Dentistry, Otago University.
President of the New Zealand Institute.
C. J. Parr, Esq., President of the Auckland Institute.
Dr. P. Barracchi, Government Astronomer, Victoria.
President of the Pharmaceutical Society of New Zealand.
President of the Dental Association of New Zealand.
G. H. Knibbs, Esq., Commonwealth Statistician, Melbourne.
M. A. Fraser, Government Statistician, Wellington.
George George, Esq., Director of Technical Education, Auckland.
F. C. Armitage, Esq., Bacteriologist, Auckland.
T. F. Cheesman, Esq., Curator of the Auckland Museum.
J. Lyons, Esq., M.R.C.V.S., Government Veterinary Surgeon.
Mr. H. M. Gore, Assistant Secretary of Congress.

PROGRAMME OF MEETINGS AND ENTERTAINMENTS.

Saturday, February 7—

3 p.m. .. Reception by President and Mrs. Purchas at " St. Arvan's," Carlton Gore Road.

Sunday, February 8—

7 p.m. .. Special services—
  St. Matthew's, Wellesley Street. Preacher: The Bishop-Elect of Auckland, Right Rev. A. W. Averill, D.D.
  St. Patrick's Cathedral, Wyndham Street. Preacher: Right Rev. H. W. Cleary, D.D. Subject; " The Church and Medical Science."
  St. Andrew's (Presbyterian), Lower Symonds Street. Preacher: Rev. R. L. Walker, M.A.

Monday, February 9—

9.15 a.m. .. Registration of members. Distribution of programmes, invitations, &c.
10.15 a.m. .. Congress business meeting at Y.M.C.A.
12 noon. .. Address by Dr. J. B. Macdonald, Chairman of Central Council of B.M.A., London.
3.30 p.m. .. Reception at the kiosk, Exhibition Grounds.
7.30 p.m. .. Organ recital, Town Hall, by G. Maughan Barnett, Esq., City Organist.
8.30 p.m. .. Opening of Congress, Town Hall, by His Excellency the Governor. President's Address.

Tuesday, February 10—

9 a.m. .. Address on medicine by Dr. Sinclair Gillies before full Congress in Training College Social Hall.
10 a.m. .. Sectional work at Technical College and Training College.
2 p.m. .. Motor trip to Titirangi, given by His Worship the Mayor, C. J. Parr, Esq., and City Council.
7 p.m. .. Dinner at Northern Club, tendered by the Minister of Public Health to Officers of Congress.
8.30 p.m. .. Alfresco entertainment at " Cintra," Symonds Street, tendered by President and members New Zealand Branch B.M.A.

Wednesday, February 11—

8.15 a.m. .. Demonstrations at Auckland Hospital.
9 a.m. .. Sectional work.
2 p.m. .. Harbour excursion, tendered by Minister of Public Health on behalf of New Zealand Government.
7.30 p.m. .. Organ recital by City Organist.
8 p.m. .. Public lecture, with lantern-slides, by Dr. J. W. Barrett, of Melbourne, on " Garden Cities, Town-planning, and American Recreation Centres," in the Town Hall.

Thursday, February 12—

8.15 a.m. .. Demonstrations at Auckland Hospital.
9 a.m. .. Lecture by Dr. F. Truby King, at Y.M.C.A., before full Congress, on " Eugenics and Education," followed by discussion.
11 a.m. .. Sectional work.
2 p.m. .. Syphilis report and full discussion.
8 p.m. .. Dinner, tendered by New Zealand members of Congress to Australian members and other guests, at " Cargen."
  Ladies' theatre party at His Majesty's Theatre (8 p.m.), and supper at the " Broadway."

PROGRAMME OF MEETINGS AND ENTERTAINMENTS—*continued.*

Friday, February 13—

8.15 a.m. ..	Demonstrations at Auckland Hospital.
9 a.m. ..	Sectional work.
1.30 p.m. ..	Contract-practice report.
3.30 p.m. ..	At Home at "Mon Desir," Lake Takapuna. Steamer leaves ferry tee at 2.30 p.m.
9 p.m. ..	Ball given by President and Mrs. Purchas at the Town Hall.

Saturday, February 14—

9 a.m. ..	Final general meeting.
	Excursion to Rotorua, special train left Auckland Station at 10.30 a.m.
3 p.m. ..	Auckland Racing Club "at Home," Ellerslie Racecourse.

The following clubs have kindly arranged to make members of Congress honorary members during their stay in Auckland: Auckland Golf Club, Maungakiekie Golf Club, Auckland Bowling Club, Remuera Bowling Club.

The Y.M.C.A. have also offered hon. membership and the hospitality of their institution to members during their stay.

COMBINED SECTIONAL MEETINGS.

Tuesday, 10th February, 1914.

10 a.m.—Combined meeting of Sections of Surgery and Radiology.

Wednesday, 11th February, 1914.

9 a.m.—Conjoint meeting of Sections of Medicine, Public Health, and Bacteriology to discuss "The Diagnosis of Smallpox, and the Best Means of Preventing its Spread in the Light of Experience gained in the Recent Epidemics in New South Wales and New Zealand."

9 a.m.—Combined meeting of Sections of Children, Psychological, Medicine, and Subsection of Medical School-inspection to discuss "The Problem of the Feeble-minded Child."

11 a.m.—Combined meeting of Sections of Medicine and Bacteriology on Rheumatoid Arthritis.

Friday, 13th February, 1914.

9 a.m.—Combined meeting of Sections of Medicine and Children to discuss "The Treatment of Medical Tuberculosis in Infancy and Childhood."

GENERAL EXHIBITS.

The Exhibition was on the ground floor, and occupied four rooms at the end of the corridor. The spaces were arranged by Messrs. Wade and Wade, honorary architects to the Congress.

1. Burroughs, Wellcome, and Co., London and Sydney.

This firm, which has coined a word in the English language—viz., "Tabloid"—and a Court of law held that they own it, had an exhibit attracting particular attention. It was an interesting display of medicinal preparations and surgical requisites. "Epinine," "Epicaine," "Lodal," and "Ernutin," were prominently displayed, with accompanying kymographic tracings indicating their actions on living organs. "Tabloid" medicine cases and dressings, "Wellcome" brand chemicals and galenicals, sera, vaccines, and tuberculins and "Tabloid" animal substance products formed a prominent feature of the firm's display.

2. Allen and Hanbury, London and Sydney.

Allen and Hanbury had on exhibit a large assortment of the best quality steel surgical instruments, manufactured by them in their own factories in England, including the latest cystoscopes, Canny Ryall's illuminating apparatus, Mayo's instruments, &c. Infant feeding, by association of ideas, immediately brings up the name "Allenbury's," and it goes without saying that their universally known infants' and invalids' foods were all well shown. Their malt preparations and pastilles were also displayed, the latter being standard lines for throat-work.

3. Parke, Davis, and Co., London and Sydney.

Parke, Davis, and Co. had a particularly interesting display of the various phylacogens that they are bringing so prominently before the profession. They also showed Wright's vaccines, together with serums, specialities, and physiologically standardized products. The hay-fever diagnosis outfit is worthy of detailed attention.

4. Kempthorne, Prosser, and Co.'s New Zealand Drug Company (Limited), Auckland.

This well-known and old-established firm had an extensive display of surgical instruments and appliances, including Holland's instep arch supports, hospital enamel ware, J. and J. dressings and sutures, Glaxo infant food, and a good selection of latest medical and surgical books from Angus and Robertson, Sydney. They carry stocks, and are agents for all the recognized manufactures in the medical world.

Amongst the books displayed was one that marks an epoch in New Zealand medical literature. It is the "Outlines of Greek and Roman Medicine," by James Sands Elliott, M.D., member of the Historical Section of the Royal Society of Medicines, Editor of the *New Zealand Medical Journal*, Hon. Surgeon to the Wellington Hospital, &c., illustrated; published by John Ball, Sons, and Davidson, London, 1914; dealing with the history of medicine from the earliest Greek and Roman periods to the later Roman and Byzantine period, with a chapter on the influence of Christianity on the healing art, and descriptions of ancient gymnasia and baths, and sanitation.

5. Potter and Birks, Sydney.

This firm had an extensive exhibit of surgical dressings and other requisites, being representatives of Johnson and Johnson (the Z.O. plasters, &c.) and the Elwood Lee Company (the truss and surgical belt, &c., manufacturers). Their nursing and sick-room appliances are well known. They are also representatives for Vibrona and for Bishop's effervescent preparations. They also represent the following firms: Waterbury Chemical Company, Endolytic (Urine) Tube Company, Fletcher, Fletcher and Co.

6. Hannams (Limited), Sydney.

This firm, well recognized as specialists in the manufacture of hospital appliances and fittings, had an exhibit which comprises a few samples of operating appliances and aseptic furniture, and also includes operating-tables, operator's stool, anaesthetics, trolly, surgeons' aseptic washstand, combined bowl-stand and towel-rail, &c.

7. Fassett and Johnson, London and Sydney.

This exhibit consisted chiefly of a display of medical and surgical requisites, emanating from the pharmacol laboratories of Seabury and Johnson. Among those products of special interest to the practitioner may be mentioned: "B.W.B." elastic-woven tension bandage; Seabury gauzes, in patent air-tight containers, packed for aseptic handling; in Mead's R.A. plaster is the modern form of the text-books' Mead's plaster; a full range of Seabury's absorbent cottons and aseptic ligatures in unique containers, and Sanitary cuspidores, were on view. This firm is the sole agent for Argyrol.

8. Mayer Meltzer and Jackson, London and Melbourne.

Mayer Meltzer and Jackson, the well-known surgical-instrument makers, London, Melbourne, Cape Town, and Johannesburg, showed the latest designs in instruments for general surgery, also a full display of the newest instruments for ear, nose, and throat, bladder, rectal, gallstone, intestinal, and all abdominal operations. They were awarded two gold medals at the recent Seventeenth International Congress, London, 1913, for their exhibit of instruments and hospital furniture, amongst the latter being their new aluminium operating-table, as shown.

9A. James Little, Melbourne.

Mr. James Little, publisher and importer of medical and surgical works, "Centerway," Melbourne, had displays and prospectuses of many modern works, and is sole agent for W. B. Saunders and Co., Philadelphia and London. Amongst those which are displayed are Mayo's clinics, Murphy's clinics, Moynihan's works, Springthorpe's great Australian works on therapeutics, dietetics, and hygiene, and Dr. Geo. Horne's Practical Gynecology, &c.

9B. Antiphlogistine—The Denver Chemical Manufacturing Company, New York and Sydney.

The Denver Chemical Company showed the well-known preparation Antiphlogistine. The pamphlet describing its uses is particularly well got up, and displays an intimate knowledge of nursing and local treatment.

10. Wilton, Auckland.

G. W. Wilton and Co. is the recognized firm in New Zealand for scientific appliances and glassware. They represent Leitz, a microscope firm, several firms of Jena glassware, and a particularly useful universal colorimeter, which may be made use of for blood-estimations and the various tests which are for sugar, &c. Sydal, their hand emollient, is a preparation which should engage the attention of medical men.

11. J. L. LENNARD AND CO., of Wellington.

This firm are the agents for lysol, which they exhibited in bottles in all convenient sizes. Lysol soap was also displayed, and the newer preparations known as Mergal, Gonosan, and Bornyval, that are made use of in Continental clinics, were available for inspection.

12. G. CULVER (LIMITED), White Lion, Islington.

They showed Sutcliffe's keratometer. This is certainly one of the most useful opthalmometers. A demonstration was given with it in the opthalmological section during the Congress.

13. REUTER E. ROTH, Darlinghurst, Sydney.

This firm exhibited a protected tap, also a self-cleaning fixed drinking-cup. These articles attracted interest at the Science Congress last year.

14. MR. K. COHEN, representing the firm of Alfred Gude and Co., Berlin, Weissen, Lee.

This was an exhibit of the local anaesthetic Narcosia, which is highly recommended by local men who have used it. There was also shown Guderin, an iron peptone manganese tonic.

15. THE SURGICAL SUPPLY COMPANY (LIMITED), Fort Street, Auckland.

This company had arranged to make a display of surgical instruments and appliances, but unforeseen circumstances prevented the completion of arrangements. They invited visitors to their show-rooms in Fort Street.

AUSTRALASIAN MEDICAL CONGRESS.

(TENTH SESSION.)

PRELIMINARY BUSINESS MEETING.

AUCKLAND, 9TH FEBRUARY, 1914.

THE preliminary business meeting of the Congress was held in the concert hall of the Auckland Young Men's Christian Association building at 10.15 a.m. on Monday, 9th February. There was a large attendance. The President (Dr. A. Challinor Purchas) occupied the chair. Seated on the platform were Dr. F. Antill Pockley (Sydney), retiring President; Dr. G. A. Syme (Melbourne), Dr. W. T. Hayward (Adelaide), Dr. E. Roberton (Auckland), Commissioners of Congress; Dr. W. C. W. McDowell, Hon. Treasurer; and Dr. B. J. Dudley, Hon. General Secretary.

The PRESIDENT, in opening the proceedings, expressed his pleasure in welcoming the members of the Congress to Auckland, on behalf of the practitioners of the city and of New Zealand. The Honorary General Secretary (Dr. B. J. Dudley) had worked very hard indeed in making the preparations for the Congress, and had done his utmost to house comfortably the visitors to the city. Various local institutions in the city outside the medical profession had proffered hospitality to the members of the Congress. The Auckland Racing Club had made arrangements to entertain them, and the Auckland Golf Club, the Maungakiekie Golf Club, the Auckland Bowling Club, the Remuera Bowling Club, and the Young Men's Christian Association had made them honorary members for the period of their stay. He also commended to the notice of members the advantage of the city's salt-water swimming-baths.

CORRESPONDENCE.

Correspondence was read (1) from Dr. W. J. Mayo, regretting inability to attend; (2) from Auckland Education Board, tendering their congratulations to Congress on the inauguration of a Subsection of Medical School Inspection and Hygiene.

THE COMMISSION OF CONGRESS.

The PRESIDENT said that the Executive had been disappointed as the time for the Congress had approached by the receipt of resignations in various sections. Amongst these were several Presidents of Sections, whose places had been filled in due course. Only that day he had received the resignation of Sir David Hardie, of Brisbane, who, unfortunately, was ill, and of whose restoration to health he hoped shortly to hear. It would be remembered that at the previous Congress a Commission of Congress had been set up. He had asked all the members of the Commission who were present to take seats on the platform, because this was the first occasion in the history of the Australasian Medical

Congress on which a Commission of Congress had been present at its sittings. The question might be asked, What had the Commission done? Well, there had been a difficulty in getting sittings of the Commission in Auckland. The Commission consisted of two representatives of each State, with the President, the Secretary, and the Treasurer. As New Zealand was a scattered community, it had been thought advisable to appoint one member of the Commission from each Island, and Dr. Batchelor had been selected as the representative of the South Island. As Dr. Batchelor had found himself unable to come to Auckland to attend meetings, it had not been possible to get a quorum of the Commission, and consequently no meeting had been held. Had anything of particular importance come up to be dealt with it would have had to be arranged by correspondence, or in some other way. However, when the Executive was stationed in Australia the same difficulty would not occur, for the centres were closer together, and there should be no difficulty in getting a quorum of the Commission. He had much pleasure in welcoming to the platform the Commissioners who were present.

REPORT OF EXECUTIVE COMMITTEE.

The report of the Executive Committee was, on the motion of Dr. B. J. Dudley (Honorary General Secretary), taken as read, and adopted, as follows :—

REPORT OF EXECUTIVE COMMITTEE.

At the final meeting of the Ninth Session of Congress, held in Sydney, September, 1911, it was decided to hold the next meeting of Congress in Auckland in 1914. Dr. A. Challinor Purchas was elected President of the Tenth Session.

The President invited the Past President, Dr. F. C. Batchelor, of Dunedin, and the President of the British Medical Association (New Zealand Branch), to confer with him as to arrangements for the session.

At a meeting of the Auckland Division of the New Zealand Branch of the British Medical Association it was resolved, on the motion of Dr. Purchas, that the members of the Division form themselves into a Committee for the purposes of the Australasian Medical Congress, 1914.

Acting on a resolution of the Ninth Session of Congress, a Commission of Congress was appointed. The Council of the New Zealand Branch of the British Medical Association appointed as its representatives Dr. F. C. Batchelor, of Dunedin, and Dr. E. Roberton, of Auckland, and two members have been appointed by each of the other Australasian States. The full Commission of Congress is as follows :—

Commission of Congress.

New South Wales—F. Antill Pockley, M.D., C.M. (Edin.), M.D. (Syd.), M.R.C.S. (Eng.) ; J. Adam Dick, B.A. (Syd.), M.D., C.M., F.R.C.S. (Edin.).

Victoria—G. A. Syme, Ch.M., Ch.B. (Melb.), F.R.C.S. (Eng.) ; R. H. Fetherstone, L.R.C.S., L.M., K.Q.C.P. (Irel.), M.D., Ch.M. (Edin.), M.D. (Melb.).

Queensland—Wilton Love, M.B., C.M. (Edin.) ; W. N. Robertson, M.B., C.M. (Edin.).

South Australia—W. T. Hayward, L.K.Q.C.P., L.M., M.R.C.S. (Eng.) ; F. S Hone, B.A., M.B., B.S (Adel.).

Tasmania—Gregory Sprott, M.D., C.M., D.P.H. (Glas.) ; G. H. Hogg, M.D., C.M. (Edin.).

Western Australia (not communicated).

New Zealand—F. C. Batchelor, M.D. (Durh.), M.R.C.S. (Eng.), L.R.C.P. (Edin.) ; E. Roberton, M.D., C.M. (Edin.), M.R.C.S. (Eng.).

The General Committee at its first meeting in April, 1912, appointed an Executive Committee to carry out the necessary arrangements for Congress. These Committees have held numerous meetings ; the chief matters dealt with are referred to.

At a General Committee meeting the Executive officers were elected as follows : Hon. General Secretary, Dr. Bernard J. Dudley ; Hon. Treasurer, Dr. N. McKay Grant ; Hon. Associate Secretary, Dr. C. H. Tewsley.

Owing to ill health Dr. Grant was obliged to resign the office of Hon. Treasurer, and Dr. W. C. W. McDowell was appointed to fill the position.

Subsequently it was resolved to invite the following to act as members of the Executive Committee : The Dean of the Faculty of Medicine, Otago University ; the Medical Heads of the various Government Departments ; the Director of Medical Service of the New Zealand Forces.

Standing Orders for the conduct of business were adopted, and it was decided to ask each State to nominate Local Secretaries.

A Guarantee Fund was established, the liability of any one member not to exceed £10. The call upon members for this guarantee met with a liberal response.

The following resolution was carried : " No medical man shall be accepted as a member of Congress except through the Local Secretary for his own State or country, to whom his subscriptions must be paid."

The Executive Committee have forwarded messages of condolence to the widows and relatives of the late Dr. Critchley Hinder, of Sydney, and the late Dr. Clendinnen, of Hawkesburn, Victoria, both of whom had consented to act as Vice-Presidents of Sections.

PATRONS.

His Excellency Lord Islington, Governor of New Zealand, and subsequently his successor, Lord Liverpool ; the Governor-General of the Commonwealth of Australia ; the Governors of the several Australian States and of Fiji and Papua ; and the Chancellor of the University of New Zealand, were invited, and consented, to become Patrons of Congress.

The Prime Minister and the Government of New Zealand have accorded countenance and support to the Congress, and have promised to print the Transactions of the session. They are also offering entertainment for members during their stay in Auckland.

VICE-PRESIDENTS OF CONGRESS.

J. C. Vercoe, M.D. (Lond.), F.R.C.S. (Eng.), President Adelaide Congress, 1887.

Sir Phillip Sydney Jones, M.D. (Lond.), F.R.C.S. (Eng.), President Sydney Congress, 1892.

F. C. Batchelor, M.D. (Durh.), M.R.C.S. (Eng.), L.R.C.P. (Edin.), President Dunedin Congress, 1896.

Hon. G. H. Butler, M.R.C.S. (Eng.), L.R.C.P. (Lond.), President Hobart Congress, 1902.

Professor E. C. Stirling, C.M.G., M.A., M.D. (Cantab.), F.R.C.S. (Eng.), F.R.S., LL.D., President Adelaide Congress, 1905.
Professor Sir H. B. Allen, K.B., M.D. (Melb.), (University of Melbourne), President Melbourne Congress, 1908.
F. Antill Pockley, M.D. (Edin.), M.D. (Sydney), M.R.C.S. (Eng.), President Sydney Congress, 1911.
Surgeon-General W. D. C. Williams, C.B., M.R.C.S. (Eng.), L.R.C.P. (Lond.), Director-General of the Army Medical Services of the Commonwealth, Melbourne.
Fleet-Surgeon Henry B. Beatty.

State Secretaries.

New South Wales—Gordon Craig, M.B., Ch.B. (Syd.), "Craignish," 185 Macquarie Street, Sydney.
Victoria—A. L. Kenny, M.B., 13 Collins Street, Melbourne.
Queensland—W. W. R. Love, M.B., C.M. (Edin.), Wickham Terrace, Brisbane.
South Australia—John B. Gunson, M.B. (Adel.), M.R.C.S. (Eng.), North Terrace, Adelaide.
Tasmania—Gregory Sprott, M.D., C.M., D.P.H. (Glas.), Macquarie Street, Hobart.
Western Australia—A. J. H. Saw, M.A., M.D., Ch.B., F.R.C.S. (Edin.), 242 St. George's Terrace, Perth.
Fiji—B. M. Wilson, M.D. (Vict.), Suva.

Local Secretaries (New Zealand).

Taranaki—D. S. Wylie, M.B., Ch.B. (Vict.), F.R.C.S. (Eng.), New Plymouth.
Manawatu—E. E. Porritt, M.B., C.M., F.R.C.S. (Edin.), 59 Ingestre Street, Wanganui.
Wellington—Matthew Holmes, M.D. (Edin.), Ch.B., F.R.C.S. (Edin.), 196 Willis Street, Wellington.
Hawke's Bay—E. A. W. Henley, B.A., M.D. (Irel.), Marine Parade, Napier.
Poverty Bay—A. L. Singer, M.A., M.B., B.C. (Cantab.), Gisborne.
Nelson—V. H. Barr, M.R.C.S., L.R.C.P., L.S.A. (Lond.), Collingwood Street, Nelson.
North Canterbury—J. D. C. Duncan, M.B., Ch.B. (Edin.), Hanmer Springs.
South Canterbury—J. R. Loughnan, M.B., B.S. (Melb.), Timaru.
Westland—C. G. F. Morice, M.R.C.S., L.R.C.P. (Eng.), M.D. (Brux.), F.R.C.S. (Edin.), Greymouth.
Dunedin—William Newlands, M.B., Ch.B. (Edin.), F.R.C.S. (Edin.), Dunedin.
Southland—W. Ewart, M.B., Ch.B., F.R.C.S. (Edin.), Invercargill.

Honorary Members.

Honorary members have been elected from learned societies and university teaching staffs.

It was decided to divide the Congress into eleven Sections, which, with their Secretaries, are as follows :—

1. Section of Medicine : Secretaries—Drs. W. C. W. McDowell and E. Roberton.

2. Section of Surgery: Secretaries—Drs. Casement Aickin and G. Gore Gillon.
3. Section of Obstetrics and Gynaecology: Secretary—Dr. Tracy Inglis.
4. Section of Pathology, Bacteriology, and Tropical Medicine: Secretary—Dr. Milsom.
5. Section of Public Health and State Medicine: Secretary—Dr. H. G. H. Monk. Subsection: Medical School Inspection and Hygiene.
6. Section of Ophthalmology: Secretary—Dr. G. Fenwick.
7. Section of Psychological Medicine and Neurology: Secretary—Dr. A. N. McKelvey.
8. Section of Diseases of Children and Orthopaedics: Secretary—Dr. G. Bruton Sweet.
9. Section of Naval and Military Medicine and Surgery: Secretary—Dr. W. H. Parkes.
10. Section of Dermatology, Radiology, and Medical Electricity: Secretary—Dr. Alfred Clark.
11. Section of Laryngology, Rhinology, and Otology: Secretary—Dr. W. A. Fairclough.

The Section of Anatomy, Physiology, and Pharmacology has, for this session, been omitted. This course has been adopted on the advice of the President of the Section, Professor Berry, with considerable regret, owing to the difficulty of arranging work for such a Section in a town in which there is no medical school.

Invitations were forwarded to the several States of Australia and to Fiji to nominate State representatives, and a Committee was appointed to select the officers and Committees for the various Sections.

Secretaries of Sections have gone to considerable trouble to get together the programme of work which is submitted for the consideration of members. Their efforts in the majority of cases have been most successful, and the hearty thanks of members are due to those who have devoted their time and energy to a most onerous task. The arranging of the work has been more than usually difficult by reason of our distance from the larger centres and the consequent delay in correspondence.

It was decided that the only special addresses to be given in full Congress be those on Medicine and on Eugenics.

Dr. J. W. Barrett, of Melbourne, has kindly consented to give a public lecture on "Garden Cities, Town-planning, and American Recreation Centres."

Special Committees were appointed to report on Syphilis and Contract Practice. Very full and complete reports on these subjects have been prepared and will be laid before Congress. The thanks of the Executive Committee are due to the compilers of those reports, particularly to Dr. W. E. Collins and Dr. Hardie Neil for the "Syphilis" report, and Dr. Tracy Inglis for the report on Contract Practice. Reports will also be presented to Congress on "Hospital Abuse," and "The Problem of the Feeble-minded Child."

It was resolved that the Tenth Session of Congress be held from the 9th to 14th February, 1914.

The subscription was fixed at £2 2s. for New Zealand members and £1 1s. for Australian members.

The following Committees have been appointed :—

EXECUTIVE COMMITTEE.

President.
Past President.
General Secretary.
Associate Secretary.
Treasurer.
Dr. Casement Aickin.
Dr. R. M. Beattie.
Dr. A. S. Brewis.
Dr. P. H. Buck, M.P.
Dr. A. Clark.
Dr. Collins.
Dr. H. Douglas.
Dr. W. A. Fairclough.
Dr. G. Fenwick.
Dr. H. M. Goldstein.
Dr. Gore Gillon.
Dr. S. L. Harke.
Dr. Hay.
Dr. Tracy Inglis.
Dr. H. O. Jones.
Dr. Makgill.
Dr. E. H. B. Milsom.
Dr. Monk.
Dr. W. C. W. McDowell.
Dr. A. C. McMaster.
Dr. Maguire.
Dr. A. N. McKelvey.
Dr. J. Hardie Neil.
Dr. W. H. Parkes.
Dr. Pomare, M.P.
Dr. J. C. Pabst.
Dr. J. C. Purdy.
Dr. E. Roberton.
Dr. C. H. Robertson.
Dr. T. Copeland Savage.
Prof. Scott.
Dr. J. E. Somerville.
Dr. S. A. Stride.
Dr. G. B. Sweet.
Dr. T. Valintine.
Dr. D. B. Walsh.
Dr. A. S. Herbert.
Dr. R. H. Walton.

RECEPTION AND ENTERTAINMENT COMMITTEE.

President.
General Secretary.
Treasurer.
Dr. Eleanor Baker.
Dr. Beattie.
Mr. A. Clark.
Mr. Gore Gillon.
Mr. Tracy Inglis.
Dr. Lindsay.
Dr. Makgill.
Dr. Milsom.
Dr. Murray.
Dr. McDowell.
Dr. Maguire.
Dr. Hardie Neil.
Dr. Parkes.
Dr. Pabst.
Dr. Roberton.
Mr. Copeland Savage.
Dr. Somerville.
Dr. Sweet.
Dr. Tewsley.
Dr. Walton.
Dr. Herbert.

LITERARY COMMITTEE.

President.
General Secretary.
Treasurer.
Dr. Beattie.
Dr. Hardie Neil.

With the assistance of Associate Secretary of Congress and the Secretaries of Sections.

CONGRESS MUSEUM COMMITTEE.

Dr. Frost.
Dr. Makgill.
Dr. Monk.
Dr. Milsom.
Dr. Maguire.
Dr. Hardie Neil.

With power to add to their number.

The Hon. Treasurer has received the sum of £400 from the Hon. Treasurer of the Ninth Session of Congress.

A Ladies' Committee has been formed, with Mrs. A. Challinor Purchas as President and Mrs. N. McKay Grant as Hon. Secretary and Treasurer. The Executive desire to express their thanks to the Ladies' Committee for the excellent work they have done and for their arrangement of the entertainments.

There are 369 enrolled, as follows : New South Wales, 55 ; Victoria, 56 ; Queensland, 22 ; South Australia, 33 ; Western Australia, 7 ; Tasmania, 7 ; New Zealand, 187 ; others, 2.

A. CHALLINOR PURCHAS,
President.

BERNARD J. DUDLEY,
Honorary General Secretary.

FINANCIAL REPORT.

Dr. POCKLEY (Sydney), in the absence of the Honorary Treasurer, presented the balance-sheet in connection with the Ninth Session of Congress, as follows :—

AUSTRALASIAN MEDICAL CONGRESS, NINTH SESSION, SYDNEY, 1911.

STATEMENT OF RECEIPTS AND EXPENDITURE.

Receipts.	£	s.	d.
Balance from Eighth Session of Congress	378	5	3
Subscriptions—			
Victoria	211	12	6
Queensland	53	15	0
South Australia	61	2	6
New Zealand—			
North Island	25	6	6
South Island	15	11	8
Tasmania	27	0	0
West Australia	19	19	0
New South Wales—			
Metropolitan	745	0	0
Country	144	7	0
Dr. Falconer Hall, Gibraltar	1	1	0
Exchange added to cheques	2	9	6
Interest on fixed deposit, £300	21	0	0
	£1,706	9	11

Expenditure.	£	s.	d.
Stamps, printing, &c.	290	10	0
Returned subscriptions	9	9	0
Sundries	105	15	2
Painting	20	0	0
Postmaster-General	6	18	2
Shorthand notes	19	15	3
Hire of chairs	7	15	0
Royal Society, rent	4	0	0
Cablegrams, &c.	15	0	7
Town Hall, Sydney	59	17	9
Clerical assistance	390	15	0
Band	12	11	0
Catering	237	17	0
Decoration	3	15	0
Expenses of Secretaries of Sections	39	1	7
Badges	14	5	0
Exchange on cheques	5	6	4
Bank charges	2	0	0
Auditor's fee	5	5	0
Amount to New Zealand	400	0	0
	£1,649	16	10
Balance	56	13	1
	£1,706	9	11

Examined and found correct.
WILLIAM ALLEN, F.C.P.A.,
Public Accountant.
16 Spring Street, Sydney, 30th October, 1913.

S. H. MACCULLOCH,
Hon. Treasurer.

In moving the adoption of the balance-sheet, Dr. POCKLEY pointed out that a sum of £400 had been handed over by the Sydney Executive to the New Zealand Executive, leaving in the hands of the Sydney officials a balance of £56 13s. 1d. Since the balance-sheet was compiled a further sum of £50 had been sent to New Zealand, leaving the Sydney officials £6 13s. 1d. to meet any small accounts which might possibly come in.

The motion was seconded by Mr. G. A. SYME (Melbourne), and agreed to.

STANDING ORDERS.

The following were adopted as Standing Orders for the control of the business of Congress :—

STANDING ORDERS.

1. Ordinary members of Congress shall be medical practitioners legally qualified to practice in their respective countries, who have paid their subscriptions to the Treasurer of the Congress or to the Corresponding State Secretary.

2. The Executive Committee reserve the right to refuse or to return any subscription.

3. The subscription shall be determined for each session by the Executive Committee thereof, and shall be payable to the Treasurer or State Secretary, and shall entitle the member to a copy of the published Transactions of the Congress, if any.

4. Honorary members, not necessarily legally qualified medical practitioners, may be elected by the Executive Committee.

5. There shall be a Preliminary General Business Meeting and an Inaugural General Meeting of Congress on the first day and a Final General Business Meeting on the last day of the session. Other general meetings may be held in pursuance of resolution of the Congress or of the Executive Committee.

6. At the Preliminary General Business Meeting the report of the Executive Committee shall be submitted, and also the report of the Treasurer of the preceding session. Other business shall be as arranged by the Executive Committee. Resolutions may be submitted by members of Congress, but only after notice of motion, which must be in the hands of the General Secretary at least a week before the first day of the session.

7. The Inaugural General Meeting shall be devoted entirely to the usual addresses and resolutions. The only speakers shall be those designated by the Executive Committee.

8. At the final General Business Meeting the place and date of the next session of Congress shall be determined, and the President for that session elected. Resolutions carried in any Section or Sections and ordered by any Section to be reported to the Congress shall be considered. Other resolutions carried in Section shall not be reported. Motions may be submitted on behalf of the Executive Committee. Other motions, of which at least twenty-four hours' notice has been given, may be submitted. The President shall have full power to restrict debate.

9. Subject to any resolutions of Congress, the business at other general meetings shall be arranged by the Executive Committee, which may, as far as it deems desirable, designate the readers of papers and the speakers.

10. The proceedings of each Section shall be regulated by the President of the Section at his discretion, provided that a provisional programme of work for each Section may be published by the Executive Committee after consultation with the sectional officers. Two or more Sections may meet together for any joint work.

11. The Executive Committee shall determine which addresses, if any, by Presidents of Section shall be given in full Congress, and which shall be given in the Section. With the exception of addresses to be given in full Congress, the address in any Section may at the discretion of the President of Section be replaced by a paper or by the opening of a discussion by the President of Section.

12. The President of the Congress shall preside at all general meetings of the Congress, unless the Executive Committee shall with his consent have arranged otherwise. In the absence of the President, the Past President of longest standing present shall preside. If this provision fails, the meeting shall elect a Chairman.

13. In sectional meetings, in the absence of the President of the Section, the available Vice-President whose name is highest in the list of Vice-Presidents shall take the chair. If this provision fails, the Section shall elect a Chairman.

14. Any debate in general or sectional meeting may be interrupted by motion proposed and seconded that the question be now put, or that the meeting pass on to the next business. The motion in either case shall be put without further debate, and if it is carried the question shall be put, or the next business called on, as the case may be. Otherwise the decision of the President or Chairman in the conduct of any discussion shall be final.

15. Unless expressly provided otherwise by the Executive Committee, no paper or report may occupy more than twenty minutes. No speaker in any discussion may occupy more than ten minutes. The author of any paper or report shall have the right of reply not exceeding five minutes.

16. Notice of all papers, exhibits, &c., to be submitted should be in the hands of the General Secretary or Secretary of Section three months before the opening of Congress, otherwise they will probably not be included in the published programme of sectional work. Papers may, however, be accepted up to and even during the meeting of Congress. All notices of papers, exhibits, &c., are subject to acceptance by the Executive Committee, or in emergency by the President of the Section concerned.

17. Reports prepared at the request of the Executive Committee or of any Sectional Committee should be in the hands of the General Secretary or Secretary of Section at least one month before the opening of Congress, and as far as possible such reports will be printed for distribution at or before the Congress.

18. Short abstracts of papers should be forwarded to the General Secretary or Secretary of Section two months before the opening of Congress, and as far as possible such abstracts will be printed for distribution at or before the Congress.

19. Members detained in other sections may forward to the Secretary of any Section a brief note to be incorporated in any discussion or in the report thereof. Such note must reach the Secretary before the close of the discussion in question.

20. All reports or papers submitted to any meeting of Congress shall be handed to the General Secretary or the Secretary of Section before the close of that meeting. They may not be subsequently altered without the consent of the Executive Committee.

21. No vote of thanks shall be proposed to the author of any paper.

22. The Executive Committee reserves the right to determine for itself or by any Committee appointed for the purpose what reports, papers, or speeches, or what parts of reports, papers, or speeches, shall be published in the Transactions of the Congress.

SUB-COMMITTEE ON SYPHILIS.

On behalf of the Sub-Committee on Syphilis, Dr. W. E. **Collins** (Wellington) brought up their report (see page 105).

Dr. **Collins**, in moving that the report be taken as read and adopted, said that as there was to be a full discussion later in the session of Congress on the subject of syphilis and venereal diseases generally he would content himself for the present with making the formal motion, and withhold further remarks until the wider debate took place. In the meantime he asked Congress to agree that the Committee's report be handed to the Press for publication and comment. The only way in which this kind of disease could be coped with was through the public. It was useless for medical men to meet in Congress by themselves—they could not attain anything effective unless they could secure the sympathy and support of the public. He wished also to pay his tribute of thanks to Dr. Hardie Neil, Secretary of the Committee, for the admirable work he had done in collating the material for the report. Those members of the Committee who lived at considerable distances from Auckland had naturally very great difficulty in giving Dr. Neil the assistance they would have wished to give, and practically the whole of the work had fallen upon his shoulders. He hoped that the Congress would recognize the energy with which Dr. Neil had applied himself to the matter.

The Hon. Dr. **Nash**, M.L.C. (Sydney), asked whether Dr. Collins proposed that the report should be submitted to the Press before it was discussed. Personally he thought it would be better to withhold it from publication until after the discussion.

Dr. **Collins** said he would leave that matter to Congress; but he thought that if the report were handed to the Press now the representatives of the Press should be allowed to be present during the discussion of the subject, in order that the public might be given the fullest possible information on the subject.

Dr. J. W. **Barrett** (Melbourne) seconded the motion for the adoption of the report. He thought all present must agree that the report was valuable to a degree, and that it had been compiled with great care. He wished to endorse all that Dr. Collins had said. On the previous evening the speakers who had been appointed from Victoria and New South Wales to debate this subject had met some members of the New Zealand Committee, and whilst they agreed almost entirely with what was contained in the report, it had been mutually agreed that the scope of the discussion should be widened—that it should not be limited to syphilis, but it should be extended to venereal diseases generally, seeing that the means of control of all venereal diseases were identical with the means of control in regard to syphilis.

Dr. SYDNEY JAMIESON (Sydney) moved, as an amendment, That the adoption of the report be postponed until after the discussion had taken place. His reason for moving in this direction was that the report contained certain recommendations to which Congress might not agree. The very first recommendation was " That syphilis be declared a notifiable disease." That proposal cut at the root of medical ethics and medical conduct to such an extent that the meeting would be very foolish to adopt it without full discussion.

Dr. YOUNG (Wellington) seconded the amendment.

Dr. HAYWARD (Adelaide) moved, as a further amendment, That the report be received.

Dr. KELTY (Sydney) seconded this amendment.

Dr. JAMIESON withdrew his amendment in favour of that of Dr. Hayward, which was unanimously agreed to.

Dr. COLLINS moved, and Dr. BARRETT seconded, That the representatives of the Press be admitted to the meeting on Thursday afternoon, at which the report was to be discussed.

Dr. LOCKHART GIBSON (Brisbane) thought that as it would be practically impossible for lay reporters to give a satisfactory account of such a discussion as was likely to take place their admission to the meeting should only be agreed to on condition that they submitted their reports to representatives of the Congress for revision.

Dr. SPRINGTHORPE (Melbourne) moved, That the representatives of the Press be not admitted, but that an official report be supplied to them for publication.

This amendment was agreed to, Dr. Collins's motion being withdrawn in its favour.

CONTRACT PRACTICE COMMITTEE.

Dr. TRACY INGLIS, Honorary Secretary of the Contract Practice Committee, brought up the Committee's report.

Dr. INGLIS moved, That the report be taken as read and received, and referred to the meeting on Friday next for discussion. He said that during the investigations of the Committee in New Zealand they found many abuses in contract practice, and the necessity for an income-limit became very apparent. There were instances of men receiving medical benefit through the friendly societies whose estates, at their death, were certified for stamp-duty purposes at sums ranging from £10,000 to £15,000. In quite a number of contracts the medical man was required to supply such things as anti-diptheritic serum. Of course, the logical conclusion in regard to abuses of the kind was that medical men ought not to enter into such contracts. But in many instances the general practitioner had to do contract-work, and it behoved them to organize their profession in such a way as to prevent this sweating of medical men. It seemed to the Committee that the first thing to do was to organize, and the next to insist upon an income-limit. This last seemed to them an essential point. He also wished to emphasize the point that all negotiations should take place between a central body, such as the British Medical Association and the friendly societies, and not between individual practitioners and their own particular society.

The Committee also felt strongly the necessity for the establishment of an indemnity fund. He was quite sure that the profession would have won many fights in the past if it had had an indemnity fund behind it. With regard to the paragraph in the report in reference to country hospitals, the Committee felt that an abuse existed in the system under which paid resident doctors in country hospitals had the right of private practice. He would not, however, discuss that matter further, as it would no doubt be touched upon in the report of the Hospital Abuses Committee.

Dr. J. SANDISON YULE (Melbourne) seconded the motion, which was agreed to.

At this stage attention was called to the presence of representatives of the Press in the hall. The reporters were asked to withdraw, and when they had done so it was explained that they had been present as the result of a misapprehension, having understood that the question whether they should be allowed to report the proceedings would be raised at the commencement of the meeting. After discussion it was decided that the Pressmen should, in the circumstances, be allowed to remain for this meeting only, on condition that they should submit their reports of the proceedings to the President and Secretary for their supervision, and that the action of the Congress in admitting them should not form a precedent.

HOSPITAL ABUSES COMMITTEE.

Dr. RALPH WORRALL (Sydney) reported on behalf of this Committee that at a meeting held on the previous evening it had passed the following resolution :—

> The Committee on Hospital Abuses find that no important change has taken place in Australasia with regard to the administration of hospitals since last Congress, and therefore have not found it necessary to recommend any modification of the resolutions passed at the two preceding Congresses in reference to this matter.

Dr. WORRALL said that the question of private practice on the part of paid resident medical officers of hospitals, which had just been alluded to by the Secretary of the Contract Practice Committee, had not been brought under the notice of the Hospital Abuses Committee. Personally he thought the custom was most reprehensible. The proper mode of dealing with it would be to bring it under the notice of the British Medical Association, and organize opposition to the practice. It was in the highest degree detrimental to the public interest, and in every country where it had obtained it had led to grave abuses. He believed that the system did not exist in Australia.

A MEMBER : It does in Queensland.

Dr. WORRALL said he knew it did not exist in New South Wales. But wherever it existed opposition to it should be organized. He moved, That the report of the Committee on Hospital Abuses be received.

Dr. HAYWARD (Adelaide) seconded the motion. In the main he agreed with the remarks of the last speaker, and he thought that the question of the position of resident hospital medical officers should be referred to the branches of the British Medical Association, and probably by those bodies to the Federal Committee. Personally he would not like to pass judgment on the matter until he had heard the other side.

Dr. SPRINGTHORPE (Melbourne) pointed out that the system existed for many years at Brisbane, Launceston, and Bendigo. Experience showed that it was a matter of evolution. Under certain conditions in the country it was practically impossible to get a medical man into a district to look after a hospital unless he was also given the right of private practice.

Motion agreed to.

PROBLEM OF THE FEEBLE-MINDED CHILD.

Dr. J. Sandison Yule (Melbourne) brought up the report from the Committee appointed to consider "The Problem of the Feeble-minded Child."

Dr. Yule moved, That the report be received. He said that those who were in touch with the subject would welcome as much publicity as the Press was willing to give to the report. The more publicity that could be given to the discussion the better it would be for all concerned.

Motion seconded by Dr. Tracy Inglis, and agreed to.

On the motion of Dr. Beattie (Auckland), seconded by Dr. McKelvey (Auckland), the report was referred to the Section of Congress on Diseases of Children and Orthopaedics for consideration.

Dr. MACDONALD'S VISIT.

The President expressed pleasure at the visit to the Congress of Dr. J. B. MacDonald, Chairman of the Central Council of the British Medical Association, London, and extended to the members of Congress present a hearty invitation which had been received from the New Zealand Branch of the British Medical Association to attend a meeting to be held later in the day, at which Dr. MacDonald would deliver an address on the subject of National Insurance.

The meeting then adjourned.

THE INAUGURAL MEETING.

The ceremonial opening of Congress took place at a public meeting held in the Auckland Town Hall on the evening of Monday, the 9th February. There was a large attendance of members of the Congress, with their wives, relatives, and friends, and of the general public. Dr. A. Challinor Purchas, President of the Congress, occupied the chair, and amongst those seated on the platform were His Excellency the Earl of Liverpool, Governor of New Zealand; the Right Hon. W. F. Massey, Prime Minister of the Dominion; the Hon. R. Heaton Rhodes, Minister of Public Health; the Hon. W. H. Herries, Minister of Railways; the Hon. Dr. Pomare, Member of the Executive representing the Native Race; the Hon. W. A. Holman, Prime Minister of New South Wales; Mr. C. J. Parr, Mayor of Auckland; the Anglican Bishop-elect of Auckland (Dr. Averill); the Roman Catholic Bishop of Auckland (Dr. Cleary); Dr. J. B. MacDonald, Chairman of Central Council, British Medical Association; Dr. T. H. Valintine, Chief Health Officer of New Zealand; Colonel Logan, A.D.C., Officer Commanding the Auckland Military District; Dr. F. Antill Pockley, retiring President of Congress; Dr. W. H. Parkes, President New Zealand Branch B.M.A.; medical officers representing His Majesty's Navy; officers of Congress and members of Commission of Congress.

Prior to the commencement of the proceedings an organ recital was given by Mr. J. Maughan Barnett, City Organist.

The President having invited the Governor to honour the Congress by opening its proceedings,

His Excellency proceeded: Mr. President, ladies, and gentlemen, at the outset I may state that the remarks which I shall address to the meeting will be somewhat brief. In fact, standing here as a layman, it would be an impertinence on my part if they were not brief. It is a great pleasure to me to open this great Congress, and I look forward to the best results from your deliberations. The Imperial Government have sent me a telegram, which I am asked to read to the Congress, as follows:—

"Please convey to Australasian Medical Congress at its opening my best wishes for the success of its deliberations. His Majesty's Government recognize importance of contributions which such Congresses have made to advancement of medical science not only in Australasia, but generally, and look forward with interest to results of this meeting in New Zealand.—Harcourt."

In opening this Congress I desire, as the representative of His Majesty the King, to extend to all a most sincere and cordial welcome. The Congress only meets in this Dominion in certain definite years, and since its deliberations were last held in these Islands many well-known men entirely devoted to their profession have passed away, leaving behind them fame and a record of priceless work. At the Congress held in London in 1881 His late Majesty King Edward VII, as Prince of Wales, performed the opening ceremony. I mention this because you are well aware of the deep interest which he always took in everything which affected the relief of pain and suffering. This is still further exemplified by the desire which our present King and Queen always show to further in every way possible those researches which are being made in the effort to defeat the terrible scourges which have, up to the present, baffled the skill and ingenuity of the medical world. In 1881 Monsieur Pasteur was present, to whose wonderful discoveries the whole world is so much indebted. Marvellous as these discoveries were considered at the time, the discovery of Rontgen rays and radium in recent years has furnished us with powerful weapons for the diagnosis and treatment of disease. I need not remind you that the International Congress which assembled in London in 1913 gathered together the great and brilliant intellects of the medical profession throughout the world. Here in Auckland are met all the men who are closely and eminently connected with medical science in Australasia, and joined with them are others equally interested in the profession from other lands. The world looks on with admiration —with perhaps a spice of envy—but with the warmest good wishes for those of your great profession who devote their lives to the study of everything that so closely affects the welfare and happiness of mankind, and I earnestly trust that the deliberations of this Congress will indeed be useful not only to yourselves but to the world at large.

The Right Hon. W. F. MASSEY (Prime Minister of New Zealand): Your Excellency, Mr. President, ladies, and gentlemen, I intend on this occasion to follow the good example of His Excellency and be very brief. I desire to join in the welcome which has been extended by His Excellency to the members of the Congress, and to the visitors from overseas. On my own account and on behalf of the people of the Dominion I should like to offer a very hearty welcome to the Premier of New South Wales, who has honoured and favoured this gathering with his presence. I am sure the great majority of those present will agree with me that no gathering could be more important than an assemblage of trained and experienced medical men, who have met for the purpose of exchanging ideas, and by so doing increasing their individual knowledge. That I take to be the purpose of this gathering. During the last quarter of a century the bounds of medical and surgical science have been enormously extended, but there is still much to learn. I am glad to know that the severity of some of the most malignant scourges that afflict humanity has been greatly mitigated by the results of medical research. I refer particularly to tuberculosis and cancer. It is reassuring to know that in the opinion of many medical men there is reason to hope that radium will furnish a means of relief from the ravages of cancer. Whether that be so or not, I am confident that the time will come in the near future, through the scientific researches of experienced men, when remedies will be discovered for some of the diseases which now carry off millions of the human race long before what has been termed man's allotted span has been reached. I am not particularly anxious to unnecessarily increase the functions of the State, but I should like to say that where scientific research is concerned, and where it is possible to alleviate human misery, it is the duty of the State to do all that in the circumstances it possibly can. That is the position I personally take up, and it is the position taken up by the Government of which I have the honour to be the head. We New-Zealanders know that we live not only in a particularly healthy country, but a country peculiarly endowed by Nature with health resorts. I need only refer to the hot springs of the thermal district, and the cold lakes and snow-capped mountains, and the magnificent but sometimes rugged scenery of the Southern Alps. In the North

Island, again, we have its mild atmosphere, and its beautiful harbours and rivers—and it is not necessary to go far from this spot to find a specimen of the beautiful harbours of this country. I sincerely hope that none of our overseas visitors will go away without extending their geographical knowledge of the Dominion, and particularly, now that they are here, of the Auckland Provincial District. I hope that in the time to come our visitors will be able to look back upon this occasion and say that they had the time of their lives. Let me conclude by giving to our visitors, on behalf of the people of this Dominion, the very heartiest welcome to the shores of New Zealand. We hope not only that their visit will be beneficial to themselves, but that the country itself may benefit by their advice and experience.

The PRESIDENT: I now have much pleasure in calling upon the Hon. Mr. Holman, Premier of New South Wales. The members of this Congress have pleasant recollections of the welcome that was given to them when they were the guests of New South Wales, three years ago. We fully appreciated the hospitality that was extended to us on that occasion, and I have very much pleasure in welcoming Mr. Holman to this meeting.

The Hon. W. A. HOLMAN: Mr. President, Your Excellency, ladies, and gentlemen, it is with very great pleasure that I respond to the President's suggestion that I should say a few words to this great gathering. Like our Chairman, I recollect the Medical Congress held in Sydney three years ago. I remember that we calculated then that it would be nineteen years before the Medical Congress would meet at Sydney again, and I can only say, for the consolation of any of our New Zealand friends who view with alarm this thronging of the faculty to Auckland, that they can reassure themselves with the reflection that it will be nineteen years before the phenomenon occurs here again. I can also say, for the comfort of any weaker brethren who may be a little halting in their enthusiasm about this occasion, that during the three years that have elapsed since the Congress met in Sydney that city has flourished and progressed marvellously; and though I will not for more than a moment refer to so thorny a topic as politics, I will say that even in politics Sydney has shown a degree of intelligence which was not expected in the days of that assemblage. I am sure we all listened with deep interest to the cabled message transmitted to His Excellency by one of His Majesty's Ministers, and its allusion to the great advancement of medical science that may be expected to result from conferences like this. When I think of the number of medical men who have left Sydney for Auckland during the last few days, and reflect that probably the majority of them suffered the same agonies of *mal de mer* as I did, I cannot help hoping that their experience will be an incentive to them to turn their attention to one of the evils that afflict humanity and keep the races of mankind asunder. If some safeguard against that kind of experience could be found it would vastly increase the number of citizens of New South Wales who would come to New Zealand, and improve alike their geographical and their social knowledge. But I feel that whatever pains it costs us, the experience is worth it. We do extend our geographical knowledge in coming to New Zealand, and if we visit the domain of our friend Mr. Herries at Rotorua we do something more. In other countries travel only increases our knowledge of this world, but in certain parts of New Zealand one may form some conception of what the next world may perhaps be like as well. Such gatherings as this are bound to be fraught with benefit to the studies which are the particular purpose of the gentlemen assembled in this Conference, and to bring about great advantage to suffering humanity. As one of the visitors I join with His Excellency and with the Prime Minister of New Zealand in wishing for every possible degree of success to the deliberations of the Congress.

The Hon. R. HEATON RHODES (Minister of Public Health, Hospitals, and Charitable Aid): Your Excellency, Mr. President, ladies, and gentlemen, it is my very pleasant duty as Minister of Public Health to offer our visitors a very cordial welcome to New Zealand's shores, and to express the hope that the deliberations of the Australasian Medical Congress of 1914 will be such that in after-years its members will be able to look back upon their visit to the Dominion as having been both pleasant and profitable. I am aware of the great advances that have been made in the various branches of medical science since the Congress last met in this country, in 1896. As a layman I may not be able to estimate those advances at their full value, but as one of the great unprofessional public I can appreciate what has been done towards the alleviation of suffering and the cure of disease, and I believe that the enthusiasm, the devotion, and I may say the heroism of the members of the medical profession will lead them on to achievements at present little dreamed of as within the domains of the prevention and cure of disease. There are many subjects set down for discussion on the Congress agenda paper in which I take great interest—an interest which has been stimulated since I became Ministerial head of the Public Health Department. The public, I need hardly say, will pay very great attention to the discussions and findings of the Congress; and summing up those findings, they will be able to form a very good idea of the legislation that is necessary. It is often the public that impresses upon us the need for legislation, and it becomes my duty, as head of the Department of Public Health, to see that legislation is carried into effect. The public will watch particularly your deliberations with regard to the effects of radium as a cure for cancer. I know that New Zealand has gained a name for its experimental legislation—that it has been wittily termed " the guinea-pig of the nations," a figure of speech which will be appreciated by members of the medical profession through their own use of the guinea-pig for experimental purposes. However, I think it will be granted that we are not in a position to enter into very costly experiments in the field of cancer research. We must in that matter be guided as yet by the experiments made in older and wealthier countries. But when once the matter has passed out of the experimental stage—when once anything is proved to be a cure for, or even an alleviation of, the scourge—it will be our duty, no matter at what cost, to procure the benefit of the discovery for the people of this country. We shall also watch with particular interest your discussion upon the recent smallpox epidemic, and I trust that by means of the light you will be able to throw upon the subject the Public Health authorities of the Commonwealth and the Dominion will be able to arrive at an understanding with regard to our future policy for coping with any epidemic that we may be confronted with. Uniformity of action in the two countries is essential. Another subject that will interest the public is that of medical inspection of schools. As far as New Zealand is concerned that matter is only in its initial stages, but the data so far collected show that we were warranted in undertaking that inspection. Those of us who have had access to the official reports have been astounded at the great proportion of the children attending our schools who require medical treatment. We have much to do yet, but I have come to the conclusion that we require systematic and regular examination of the children attending our primary schools. There will also be discussions on the administration and control of tuberculosis, the prevention of hydatids, and other matters which concern the public closely. I trust that the visit of our friends may be both pleasant and profitable to them, and that they will see of our country sufficient to again induce them to brave the terrors of the Tasman Sea referred to by the Prime Minister of New South Wales, and pay further visits to the mountains, the lakes, and the woodlands of this beautiful country.

The Mayor of Auckland (Mr. C. J. Parr): Your Excellency, Mr. President, ladies, and gentlemen, I am glad to have this opportunity of welcoming the members of the Congress to the city. It is an honour to Auckland that this important Conference should be held in our midst, but probably the city is worthy of it. We have no less than 110,000 people resident in the city and suburbs. In fourteen years we have doubled our population, and, better still, our exports. Who can tell what will happen in the next fourteen years. In extending a warm welcome to our Australian visitors I would wish especially to greet those medical men of New Zealand birth who are now practising in Australia and have returned to their native land for the purposes of this Congress. Amongst the visitors I notice Dr. Sinclair Gillies, son of the former respected Judge of the Supreme Court in Auckland, who is Chairman of an important Section of the Congress, and I can assure him that we are all delighted to see him. My own feeling towards the medical profession is one of profound respect. I have cultivated this feeling, notwithstanding the warning that was given to me twenty years ago by an old friend, who told me on the eve of my marriage to be sure to keep two particular people out of my house—the doctor and the plumber. The speakers who have preceded me have very properly referred to the immense progress which has been made in the acquisition of medical knowledge, and the great advancement of modern surgery. But while one willingly admits all this, one still feels rather saddened when one thinks of the directions in which there are still distinct bounds placed to human knowledge. Applying the words of Cecil Rhodes, one is still inclined to say with regard to medical science, "So little known—so much to know." Such a profession opens up an immense field for future discovery and future knowledge that will be for the benefit of mankind. We are all delighted to see that the Congress is giving attention to the subject of town-planning. I fail to see why our cities and towns should be allowed to grow up on random lines, chiefly guided by the whims of the speculator. The time is ripe for legislation providing that every town and every suburb shall grow according to a systematized plan. On behalf of the citizens of Auckland, I wish the members of the Congress every success in their deliberations.

THE PRESIDENTIAL ADDRESS.

The President: Your Excellency, ladies, and gentlemen, it is now my privilege to welcome you on behalf of Congress. To my colleagues of the medical profession, especially to those who have come from the Mother-country, and to others from their busy life in Australia, I give a special welcome. His Excellency the Governor, with the Prime Minister, the Minister of Public Health, and His Worship the Mayor of this town have all expressed our welcome to you and our pleasure at seeing you amongst us. A welcome is extended also to all those ladies and gentlemen in my audience not belonging to our profession who honour us by being present at this gathering, which falls to the lot of Auckland once in about eighty years. It is held every three years in rotation. In Australia the meetings have taken place at Sydney, Melbourne, Adelaide, Brisbane, and Hobart—that takes fifteen years; any day Western Australia, which hitherto has not claimed the right, may decide to hold it there, making eighteen years; then comes New Zealand's turn—twenty-one years. New Zealand is quadricapital, so that every twenty-one years it will fall to the lot of one centre in New Zealand to have the honour of holding Congress there. Hence, in the natural course of events, Auckland's next turn will come in 1998. Although I feel that nothing will ever prevent my taking a proper interest in all that appertains to my profession, I feel that I must ask you to excuse me personally on that occasion, as I shall be engaged elsewhere.

On behalf of the profession in New Zealand I extend a hearty welcome to all our visiting brethren, who have travelled so many miles, braving the dangers and discomforts of the "briny." We have endeavoured to put before you a menu that will afford abundant mental pabulum for each, according to his individual taste, so that those who have come here will, when they leave, feel that, though they have imparted some knowledge, they have added somewhat to their own store. At the same time we have not neglected the lighter side, for we have endeavoured to set before you a dainty fare in the shape of some of the scenic beauties with which Nature has so bountifully endowed this "last, loneliest, loveliest" spot of the earth.

It would ill become me to sing the praises of Auckland, my native town, because it would be akin to "gilding the gold," but when you have been guided round Auckland and its suburbs you will no doubt be pleased by what meets the eye, because Nature has been very generous with her gifts, and has left a splendid heritage for the inhabitants of this city; but "man alone is vile," and has shown it in the want of good planning and architecture. Any one referring to an old picture of Auckland, before much building had taken place, must be struck by the grand possibilities that presented themselves to the artistic mind. How that opportunity was lost can only be imagined by looking upon many of our present public buildings and waterfront and comparing them with what might have been. It seems to be a mania with the "powers that be" to fill up all the bays by cutting down the headlands, by making one straight line, the front of which culminates in a rugged concrete sewer. Those picturesque bays which were the charm of Auckland Harbour in its early days are now nearly all straightened up, filled, and guarded by a forbidding, unsightly barricade. How very much better from a utilitarian standpoint it would have been to retain, say, Hobson Bay, dredge it, and so make a picturesque haven for small craft, including our pleasure fleet, which at present has no place of safety. Then the eye would be pleased and rested by Nature's unspoiled curves, so beautifully pointed out by Ruskin, and Auckland might have been unrivalled in her picturesqueness, as a charming jewel nestling in a magnificent setting.

There are some here who have been present at former Congresses; many there are who are "colts," and have never been to a Congress before—may they become leading lights, and do their share in the advancement of science and the promulgation of that good-fellowship that, beginning at college, when one's cares come only at examination time, continues throughout lifetime and is the great incentive that draws men together on these important occasions in the endeavour to lessen somewhat the ills that flesh is heir to, and that helps us to carry out the greatest rule of life—to help the other fellow.

There should be present amongst us to-night a dear old friend to many of us—namely, our first New Zealand President. I refer to Dr. Batchelor, of Dunedin, who piloted the Dunedin Congress so successfully that, to this day, our Australian friends have not ceased to sing his praises. We all regret that he is unable to be with us to-night, but trust that he will live to see and attend many more Congresses.

I wish to welcome most cordially, on behalf of the Congress, Dr. J. B. MacDonald, who has come from London to represent the British Medical Association, of which he is Chairman of Council. His reputation as a capable and sagacious leader of the profession has spread to every part of the British dominions where a branch of the Medical Association is established.

I have to thank you for the honour you have conferred upon me by electing me President of this Congress, which I need hardly say I fully appreciate, being, as it is, the highest honour conferrable on a member of our profession. As it has fallen to my lot I gratefully accept it, knowing full well that, although I am quite unworthy to hold it, you will give me your kindly and whole-hearted support in carrying out the onerous duties involved.

In order to try and show you that I have realized the responsibility of the position I may tell you that I have never ceased to work for the Congress since my election in 1911, and that, thanks to the able support and the help that has been given continuously ever since by my Secretary, Dr. B. J. Dudley, and other officers, especially by my Executive Committee, I hope you will find that everything is properly organized, and that what we have undertaken will be done to your entire satisfaction.

It is due, I think, to those who take an interest in the history of medicine and surgery in this country that, on occasions such as this, more than a passing reference should be made to the art of healing as known and practised by the Maoris. The late Dr. W. H. Goldie, an Auckland boy, in conjunction with Mr. Elsdon Best, published an excellent paper on the subject, from which I have culled several interesting points.

As regards medicine, the Maoris made use of quite a number of the indigenous plants, but used them with but little knowledge of their physiological action. Medical treatment amongst the Maoris was carried on mainly through the medium of witchcraft, the Maoris as a race being highly superstitious.

Kikokiko (Ghost Souls).—There are two supernatural forces to which the Maori attributes most cases of sickness, especially internal and obscure cases, and these influences are—first, the presence of an ancestral ghost or *kehua*, and, second, the occult powers of the sorcerer or tohunga. The wandering spirits of the dead caused most of the diseases. When a Maori dies, the *wairua*, or dream ghost, or soul, which during life could leave the body and wander at large when its owner slept, becomes a *kehua*. "*Kehua*," says Best, "are the spirits of the dead which revisit their former haunts of this world, and make things unpleasant for the living." *Kehua*, it appears, returned to earth generally during the night-time—they dreaded sunlight and the light of fires. Some say the *wairua*, or ghost of a dead person, remained here as a *kehua* or *atua whakahaehae* until the body was buried ; it then descended to Hades.

The tohungas had elaborate ceremonies by means of which they restored the soul to a person just dead, but the feat was rarely performed, because the necessary astrological juxtapositions were rarely favourable.

The Maoris had other very malignant disease demons which were accountable for many illnesses. According to the Maoris, woman was the source of all evil—a most unchivalrous belief, and the very opposite, of course, to that which we hold. There is no evidence to show that any of these ladies practised hunger strike, or that they burnt meeting-houses.

Then there is the Maori *makutu*, by which the tohunga has simply to tell a man he is going to die, and he does die—there is an end of it. The only person who can raise the *makutu* from the victim is a tohunga of superior powers. The Maoris were not without their grand healing rites and other rites, by means of which diseases were warded off and cured.

Treatment of Wounds.—Both herbs and priestly incantations were resorted to in the case of serious wounds. If a warrior is compelled to strike down a friend or relative whom he does not desire shall die, he rubs some spittal on the body of the fallen one, at the same time repeating a charm, for the saliva is *tapu*, or holy, and has healing as well as destructive powers. If an important personage is seriously wounded he is led by the medicine-man to the *tuahu*, or altar, where offerings are made to the gods, and certain *karakia* muttered to propitiate the gods, while the *atua* are fed with blood, and blood-clots from the wound are lifted up on a staff before the altar of the god Mua. Then there is repeated a healing incantation.

A choking person was relieved by means of charms, the sufferer being slapped on the back at the time of repetition.

Leprosy.—The history of the introduction of this disease into New Zealand is uncertain. At one time it was quite prevalent. It has now almost entirely disappeared. Dr. Arthur Thomson in 1854 gave an excellent account of leprosy amongst the Maoris. He saw six cases. According to him it was more prevalent early in the nineteenth century than it is now. The Maoris called it *ngerengere*. While in the Wanganui district in 1903 the Hon. Dr. Pomare discovered an undeniable case of leprosy at an up-river Maori settlement, some fifteen miles above Wanganui town. He discovered the bacilli of leprosy, and had the patient isolated from the other Maoris. So far the only two proved cases of leprosy in New Zealand have been Maori cases (that is, apart from the case of a Chinaman in Otago).

An aged chief of the Ngatiawa Tribe has stated that *ngerengere* is a plebian disease, unlike the *whewhe* (boils) and *hakehake* (probably the itch) which are aristocratic complaints. If a person appears to be recovering from the *ngerengere*, that means that the causes of the diseases have fled to the ocean, but ere long they will return and again assail the person ; then he will die. This disease was first introduced by the Ngatiwhatua Tribe. It appeared at Taupo a long time ago, and the first person afflicted by it there was cast into a cave called Oremu (Best). At one time the Maoris endeavoured to cure the disease by keeping the leper from sunrise to sunset in a vapour-bath. During the process of steaming, the tohunga repeated the *karakia* and charms especially applicable to such a malady. The diet during treatment was entirely vegetarian, no flesh or pork being allowed, but in spite of all treatment the cases ran their course unchecked.

Fractures.—Fractures were treated by encasing the limb with splints of bark, or the strongest parts of the flax-leaves. Compound fractures were sometimes carefully set, laid upon pillows, kept clean, and the pressure of the clothes kept off by wicker hoops. Sometimes the limbs were well set, and the splints very efficiently applied and kept in position until the bones were firmly united. The process of setting the fracture was greatly facilitated by repeating a special invocation to the demi-god Tiki. The healing of the broken bone was hastened by repeating a charm known as *hono*, such as the following :—

Tutakina i ou iwi,
Tutakina i ou toto,
Tutakina i ou mongamonga tena te rangi,
Ka tutaki, tena te papa ka whenua.

which, being translated, is,—

Close up your bones,
Close up your blood,
Close up your marrow, and be united as the heavens,
And let your bones be strong as the earth.

The foregoing would appear to show that the Maoris had some rudimentary idea as to the structure of the bones, and were no mean poets.

Burns and Scalds.—The Maoris applied the feathery plumes of the toetoe-grass (Prince of Wales feather) in the form of a poultice to a scalded surface, and while applying it repeated a *karakia*, or prayer, to Tiki.

Skin-diseases.—Boils (*whewhe*) were of common occurrence in former times, but are not so frequent now owing to improved sanitary conditions. The Maoris attributed the complaint to eating decomposed and fermented corn, of which they were extremely fond, but doubtless it was caused by bathing in small, filthy, common bathing-pools ; many of the patients having boils at the time polluted everything they touched.

Eye-diseases.—Owing to the huts being very low and having no fireplaces, it stands to reason that eye complaints were common amongst the Maoris. They suffered from weak eyes (*toretore*), watery eyes (*toriwai*), sties or boils on the eyelid (*kiritona*), ectropian or eversion of the eyelids (*kirikiritona*), and other inflammatory conditions. What the Maoris suffered when the eyelids were tattooed can only be imagined. The Maoris were subject to *rewa* (squint) and *paua* (corneal opacities), and senile cataract had the same frequency of occurrence as in Europeans. Certain charms were used for the relief of blindness.

Toothache.—As a rule the teeth of the Maoris remained in such excellent preservation throughout life that in a series of eighty-three skulls examined by Professor Scott, of the Otago University, the teeth were all free from the slightest sign of dental caries. In seven he noted the cavities of alveolar abscesses. Six of these cavities were found in the upper jaw and one in the lower, and most of them had been at the roots of either the incisor or premolar teeth. One method adopted by the Maoris of treating toothache was to place one end of a small stick against the tooth, and then to strike the other end a smart tap with another stick.

Insanity.—Maori philosophers regard the body and the mind as separate entities. The spirit, or what we regard as the soul, is with them not a single but a compound intangible and invisible spiritual essence. Dr. A. S. Thomson, writing in 1854, stated that insanity and idiocy were not of frequent occurrence in the aboriginal villages.

Goitre.—Goitre, or *tenga*, is common in the high-lying district inhabited by the Tuhoe tribes. Those afflicted by it are chiefly women. Best has only seen three men afflicted by goitre, but many women had it, and quite young. No attempt seems to have been made to cure it.

To restore a person apparently drowned the process known as *whakapua* is employed. The person is held so that the smoke of a fire will enter his nostrils and so revive him. The same treatment is adopted in cases where persons have been bitten by the poisonous katipo spider.

The Maori's Aversion to European Doctors.—Medical men in dealing with Maoris have always experienced a certain amount of difficulty, as the Natives have always had a dread that the doctor will interfere with their state of *tapu*. A Maori will always show great reluctance to having a tumor or an injured limb removed. Fortunately for the Maoris that feeling is gradually passing away, and we have at the present time several qualified practitioners of the Maori race who have done excellent work in instructing the Maoris in the laws of health and in the improvement of their sanitary conditions.

Honour is due to the pioneers of our profession, who have done much good work in the early days of this colony. Of those medical men who visited these shores and left their mark, some were physicians and others surgeons. Some became authors, while others deserted the medical profession for the more profitable arena of politics. A careful search through Tasman's journal failed to disclose a medical man amongst his company. He mentions that all on his ship were at times badly affected by "sea disease," which they were unable to cure (page 28). The complaint was most probably scurvy. How much better it would have been for Tasman had he taken the precaution of carrying a medical man with him on his voyage, as his crew would not then, we may believe, have suffered to nearly the same extent from "sea disease." Dr. Solander, who came to these Islands with Captain Cook, was born in Sweden in February, 1736. He was a *protégé* of the great Linnaeus, who procured for him the offer of the botanical professorship at St. Petersburg, which, however, Solander decided to decline in favour of accepting a post in the British Museum. In 1764 he was elected a Fellow of the Royal Society. In 1767 he made the acquaintance of Banks, who induced him to accompany him to the Pacific. His post at the British Museum was, however, kept open for him, a deputy being installed during his absence. Linnaeus continued to take a great interest in Solander, and was much concerned when Solander decided to make a second visit to the South Seas, deploring the fact that all the valuable specimens that Solander had collected during his first voyage would remain uncatalogued and become the prey to insects during his absence, and remarking that he believed the world would be delighted and benefited by all these discoveries, and that true science would be strengthened so as to endure through all generations. Linnaeus also complained that Solander did not answer his letters, from which fact we can gather that, as far back as 1766, medical men possessed some of the same qualities that they exhibit even to-day.

William Perry was surgeon to the "Endeavour."

Dr. M. Wall, who was a physician at Oxford, wrote dissertations on select subjects in chemistry and medicine, giving observations on the diseases prevalent in the South Sea Islands.

The next mention we have is of Dr. G. Foster, who wrote his thesis for his M.D. degree on the edible plants of the South Pacific islands. This was written in Latin, and therein are described sixteen plants found in New Zealand.

John Savage, surgeon—"Some Account of New Zealand": In this is given the first description of New Zealand after that of Captain Cook. Savage went to New South Wales in 1803 and there introduced vaccination, was surgeon to the convict ship which visited New Zealand for spars in September, 1805, returned to England in 1806, and then entered the Honourable East India Company's service. "Moyhanger" (*sic*) accompanied him to England, being the first Native of New Zealand to visit those shores, and after a few weeks' stay returned with Captain Skelton by the sailer "Ferret."

Dr. R. M. Martin wrote "A History of the British Colonies" in 1834.

Dr. W. B. Marshall wrote in 1836 a personal narrative of two visits to New Zealand in H.M.S. "Alligator," made in 1834. H.M.S. "Alligator" was detached from the East Indian Squadron to visit Australia and Polynesia. Spent March of 1834 in the Bay of Islands and Whangaroa. Gave an enthusiastic account of the mission and Mr. Busby, British Resident; also account of the gift of a national flag to New-Zealanders. Baron Hugel was a passenger. The second visit of the "Alligator" was from Sydney, for the purpose of rescuing British subjects wrecked in the "Harriet" and made captive by the New-Zealanders at Taranaki. Remained in New Zealand during September and October, 1834. Gave a good description of the Native pas and whares on the Sugarloaves. The Natives by this expedition were treated with cruel severity and injustice. Dr. Marshall lost his life in the Niger expedition in 1841.

Dr. Guillon (1837) gave considerable information regarding Baron de Thierry.

In 1831 the immortal Darwin left England on board the "Beagle," and completed the circumnavigation of the world on the 2nd October, 1836. Darwin was a medical student in Edinburgh, where he resided in Lauriston Place. A brass tablet now marks the spot. The "Beagle" brought up at the Bay of Islands, and remained there for ten days in 1835. It is interesting to note that Darwin formed no favourable opinion of New Zealand.

Thomas Beale, surgeon, published in 1839 a book dealing with the natural history of the sperm whale, its anatomy and physiology, &c., embracing a description of the extent as well as the adventures and accidents that occurred during the voyage in which the author was personally engaged.

Professor Richard Owen, C.B., F.R.S., of comparative-anatomy fame, published the notice of a "Fragment of the Femur of a Gigantic Bird of New Zealand" in the Proceedings of the Zoological Society, 12th November, 1839, being the first contribution to our knowledge of the moa (*Dinoris*); and again in 1879, "Memoirs of the Extinct Wingless Birds of New Zealand, with an Appendix on those of England, Australia, Newfoundland, Mauritius, and Rodriguez." From a portion of a moa's femur Professor Owen, recognizing its avian character, described it, and with the aid of further specimens sent by the Rev. W. Williams he was able to build up the skeleton. His wonderful accuracy has been verified by later discoveries of skeletons which have been pieced together. Mr. Cheeseman, the Curator of the Auckland Museum, has, by the help of many emu-skins, constructed a complete moa which is well worth a visit, and can be seen at the Museum.

F. D. Bennett, F.R.C.S., describes a whaling voyage round the globe from 1833 to 1836.

R. G. Jamieson published a book entitled "New Zealand, South Australia, and New South Wales, a Record of Recent Travels in these Colonies," and gave a pleasant account of a ten-months visit to the Bay of Islands and Thames district in 1839–40.

Dr. R. McCormick, chief medical officer, naturalist and geologist: Voyages of discovery in the Arctic and Antarctic Seas and round the world, being personal narratives of attempts to reach the North and South Poles, and of an open-boat expedition up the Wellington Channel in search of Sir John Franklin and Her Majesty's ships "Erebus" and "Terror," in Her Majesty's boat "Forlorn Hope," under the command of the author. In 1841 the vessels spent three months at the Bay of Islands.

Dr. Dieffenbach was naturalist to the New Zealand Company, and wrote a very interesting book on his travels in New Zealand, published in 1843.

Sir John Richardson, M.D., F.R.S., wrote on the "Present State of the Ichthyology of New Zealand," in 1843.

Drs. Richardson and J. E. Gray wrote the "Zoology" of the "Erebus" and "Terror," 1844–75.

Dr. Samuel McDonald Martin was quite an interesting personage from an Auckland point of view, both as the author of a trenchant, even libellous, book, dealing with many leading men who were about 1839–44 making history in New Zealand — Hobson, De Thierry, Shortland, Fitzroy, Spain, Clarke, Rauparaha, Heke, Selwyn, &c.—and as editor of the first Auckland newspaper—the *New Zealand Herald and Auckland Gazette*—in which he boldly denounced the Government mismanagement.

In 1848 Dr. G. A. Mantell wrote on the "Fossil Remains of Birds collected in various Parts of New Zealand," in which he reports that the Maoris state that birds taller than a man were formerly abundant, and some said they had seen the bird.

Arthur S. Thomson, surgeon to the 58th Regiment, was a very observant man, and one of those who, unlike many of our pioneers, committed his observations to paper. Hence his writings, which are wonderfully accurate, have now become classics. He contributed to the *Medico-Chirurgical Review*; described two caves in the North Island containing moa-bones; wrote on the diseases of the Maoris and modes of treatment, climatic influences producing diseases among emigrants;

described the Maori race; gave statistics of Auckland; and wrote a "Story of New Zealand," which latter Dr. Hocken describes as one of the best-written histories of New Zealand, written in charming style. He died suddenly in Tien-tsin in 1840.

Dr. E. Shortland, 1851, wrote on the "Southern Districts of New Zealand"—walked most of the way from Akaroa to the Bluff, and back by a different route.

Dr. W. L. Lindsay was a most prolific writer, chiefly on natural science, including geology of the goldfields of Otago and Auckland.

While H.M.S. "Acheron" was surveying the New Zealand coasts under command of Captain Stokes, Dr. C. Forbes wrote an article on the "Geology of New Zealand, with Notes on its Carboniferous Deposits," in 1885.

Sir James Hector, M.D., F.R.S., Curator of the Colonial Museum, one of our greatest authorities on scientific matters connected with New Zealand, edited a large number of reports and scientific papers as well as a "Handbook of New Zealand," and, with Professor Hutton, edited "The Fishes of New Zealand."

Dr. J. D. Hooker, M.D., R.N., F.L.S., Assistant Surgeon of the "Erebus," wrote a valuable work in six volumes on the botany of the Antarctic voyage, 1844; also the "Flora of New Zealand"—a classic; also an article in the *Journal of the Ethnological Society*, 1869, on "Child-bearing in Australia and New Zealand."

Dr. Isaac Earle Featherston was for twenty-five years foremost in the political life of Wellington; was Superintendent of the province on its foundation; was elected for eighteen consecutive years. He was one of the earliest settlers in Port Nicholson.

Andrew Sinclair, M.D., R.N., was Colonial Secretary for eight years. He came to New Zealand with Governor Fitzroy; was exploring with Dr. Von Haast, and was drowned in the Rangitata River.

The Hon. Daniel Pollen, M.D., forsook his profession and entered the arena of politics, wherein he distinguished himself, and was considered to be one of the most eloquent speakers in the House.

The Hon. Dr. Grace was for many years a politician as well as a medical man.

Dr. Maunsell, of Dunedin, was a pioneer in brain surgery, and the originator of a successful method of intestinal anastomosis.

Dr. Cleghorn was a surgeon of exceptional attainments, as well as a charming personality.

Dr. Hocken—well known to many of us as an enthusiastic collector of New Zealand literature and compiler of "Bibliography of New Zealand"—was a genial and successful practitioner of great integrity.

In modern times a surgeon comes into an operating-room which is equipped with every convenience, and it is almost impossible for him to introduce germs into the wound. How different it was in the old days, when chloroform was only just known, antisepsis was unheard-of, the trained nurse not available, the room often full of treasured heirlooms laden with countless micro-organisms waiting to be conveyed into the coveted nidus of the wound. It is a wonder that any cases did escape infection and all of them did not die. It was in surroundings such as these that my father, who, by the way, was Medical Superintendent of the first established hospital in New Zealand (the building still stands at St. John's College), conducted a series of thirteen operations upon the abdominal cavity, twelve of which were successful. The first was done in 1870; the last two I had the privilege of assisting him with were done in 1885 and 1886. Of that list there are at least to my knowledge four still living, and three of them are present to-night. That, I think, is a record of which this small city may well be proud. The clamps and cauteries were made in Onehunga, and by the village blacksmith.

In making a passing review of modern advancement of medicine and surgery time compels me to limit my observations. In surgery extraordinarily good work is being done in the joining of blood-vessels, and also experimentally in the transplantation of organs—*e.g.*, the kidney. Blood-vessels are now being sutured for aneurism; new joint-linings are now being formed from fascial structures; new bones grafted into diseased spinal columns to overcome deformity arising from tubercular disease. The treatment of fractures has been revolutionized by adopting massage and movement, owing chiefly to the excellent work of the late Lucas Championiere.

The surgery of the pituitary body has grown beyond all expectations; the dorsal spinal roots are no longer untouched, being divided for relief of pain and spastic conditions; thoracic surgery is no longer a flight of the imagination, but an accomplished fact; surgery of the intestines has now so far advanced that quite large portions can safely be removed, and junctions can be made just where necessary; and the field of anaesthesia has now become an exact science—local anaesthesia has been much extended. In the field of physiology we find that of recent years it has become absolutely changed. Great investigations with regard to tissue metabolism have been made—the physiological chemists have almost made up the proteid molecule. Schaefer thinks we may admit the possibility of the formation of living from non-living substances; in fact, in two years' time a text-book of physiology is obsolete, so great is the progress.

The work of Sir Almroth Wright, which deals with the prophylaxis and cure of infective disease, is quite recent, and is being daily utilized.

Flexner and Lewis on cerebro-spinal meningitis and infantile paralysis are things of to-day.

The trend of this marvellous progress in the unravelling of the mysteries of nature is that we are coming nearer to the realm of preventive disease. Hygienic measures, prophylaxis, and treatment have already increased the duration of life, as proved by statistics. Our grandmothers and great-grandmothers have been dinning it into our ears that prevention is better than cure, and what is more certain than that we shall have, at no distant future, a prophylactic for "all the ills that the flesh is heir to"? So that, instead of having to confess that "there is no health in us," we shall boldly assert that we are brimful of health, and not only believe it, but feel it too; and who can tell if it will not come to pass that we shall attain the age of a hundred years, or even a hundred and fifty years, before we begin to feel the mark of time upon us?

Since our last Congress met in Sydney, in 1911, death has deprived us of some of the leaders of our profession, many of whom were friends of those present. Foremost among them were Lord Lister, Jonathan Hutchison, John Hewlings Jackson, Dr. Joseph Bell, Lucas Championiere, Dr. G. A. Gibson, Pavy, Gotch, Lambkin, Alexander Bruce, Butlin, Furneau Jordan, Jordan Lloyd, A. R. Wallace (a great friend of Darwin; attained the age of ninety-one; referred to by Darwin in the

"Origin of Species"; Wallace's theory of evolution holds the field to-day in preference to Darwin's), Sir Henry Swanzy, Miss Jex-Blake, McBurney, Galabin, Whitehead, Dr. Hinder, Right Hon. Lord Ilkeston, Sir — Graham, and Dr. Clendinnen. The time at my disposal does not permit of more than a mention of those illustrious names that recall their many efforts and the excellent work they have accomplished, mingled with feelings of sadness that they are no longer with us.

The Government of this country did well when it passed the Infant Life Protection Bill. Let me speak as one who had personal experience of what existed before the Act was passed. One of the saddest and most depressing duties one had was to be called to attend one of the boarded-out children, of which there always were many. It did not matter what instructions you gave, and what efforts you made, you had the mortification of seeing that child gradually fade away till eventually it died. The first good move was to make it compulsory to have an inquest on each infant that died. That greatly reduced the mortality, but was not sufficient. Now, since the passing of the Infant Life Protection Bill, it is the rarest thing to have a mortality amongst those children, and each one saved is a distinct asset to the State. The Government of this country very wisely does not stop there, but it takes the place of the parent to all children considered by the Bench to require it, and by that means thousands of children are carefully brought up, educated and trained, and have an equal start in life with those who are fortunate enough to have good parents—in fact, they have a better chance in life than many who are left with their parents. By these excellent Acts of the Government incalculable good is being done to the whole community.

The State, through the Department of Education, takes charge of dependent, delinquent, and defective children. In suitable cases the Magistrates make an order for maintenance against persons liable. The first class are boarded out in suitable foster-homes until they reach the age of fourteen, when they are put into farms or domestic service, remaining under State guardianship until the age of twenty-one, during which time a proportion of wages earned is put aside on deposit at the savings-bank. Delinquent children are detained in industrial schools or training-farms, and the defective in special institutions.

Inquiries three years after leaving State control show that 90 per cent. of the children are leading respectable, useful lives, taking on an average a better position than did the parents. The home training in the boarding-out system is of the greatest moral service. Since its inauguration the death-rate of these children has fallen below Dominion average. The inspection of homes registered under the Infants Act is carried on by the managers of industrial schools, and since its commencement the infant death-rate in these homes has been greatly reduced.

A nursing home in each centre to deal with premature and unnourished children is desirable, as also a maternity home for unmarried mothers, where the mothers might remain for six months after confinement, thus obviating the necessity of separating mother and child, and improving the outlook for the child.

Adoptions under State guardianship are looked upon with suspicion, and carefully considered before permitted. Any premium must be deposited with the Department and paid out in weekly sums.

Report on special schools, 1912: Number of children under the Act, 2,784; number of children boarded out or in situations, 1,869; number of children in private (Roman Catholic) schools, 257. Infant-life protection: In licensed foster-homes, 1,228 (from one to six per home); deaths, 12, or 0·98 per cent. In exempted institutions, deaths 86, or 3·95 per cent.

The Medical Act amendment has hitherto failed to pass, but we hope that it will become law next session, and the public will then find that protection is thereby afforded to themselves. All thinking people must realize that it is in the interests of the public that the qualification of those who are legalized to practise should be based upon a sound and thorough medical training. It is indeed difficult to believe that there are places in which persons can obtain a qualification, or so-called "degree," with a few months' teaching, and that these ignorant people are let loose upon the community. It is absolutely necessary that the public should be protected from such men as these, therefore all right-minded people will welcome the passing of the Bill, and will do all they can to help it.

We originally decided to have a Section on Anatomy and Physiology, and had elected a President and officers for the Section. I was disappointed later on to get a suggestion from the President that, as it was customary not to hold such a Section when Congress was being held in a non-teaching centre, he advised us to abandon the Section, which we reluctantly did, because we have not a Medical School here. Having the largest population in New Zealand, I think it is a great reproach that we have not. In the early days Dunedin had more enterprise, and established her Medical School. Perhaps it would be a pity to remove the Dunedin school here, but it will certainly come to pass that, as the population increases, a Medical School must before long be established in Auckland, where everything is in its favour—large population, hospital with three hundred beds—and it will be a healthy rival of that in Dunedin. I feel confident that when the next Congress is held in Auckland we shall be able to have a Section for Anatomy as well as Physiology, and perhaps some other "ology" that at the present day is undreamt-of. Every one will agree that a Medical Congress without the Section of Anatomy and Physiology is as incomplete as it would be without a Section on Medicine or Surgery.

Treatment of Mentally Unsound.—The profession cannot rid itself of an uncomfortable feeling that the treatment of these unfortunates, who by force of circumstances are compelled to be inmates of our mental hospitals, is not by any means what it ought to be. In the first place, it is an open secret that they are badly overcrowded; secondly, those responsible for the care of these patients are terribly hampered in their treatment by want of proper classification. This undoubtedly is a pressing need, and one which should be remedied without delay, because it is well recognized that the recovery of many cases is retarded, and certainly of some rendered impossible, through the impossibility of proper classification owing to overcrowding. Further, there is a pressing need for what might be termed a convalescent home or an observation hospital, where patients could be placed on trial for a term before being returned to their homes, where they sometimes relapse; also as a safe and proper place for those doubtful cases which require watching for a time before being committed to a mental hospital.

Alcohol.—A vast deal has been said for and against alcohol, but there are one or two points I feel compelled to touch upon. There can be no manner of doubt that the use of alcohol, the drug—I would have it clearly understood that I refer to the drug and not to the beverage —in the practice of medicine has decreased to a very considerable extent during the past twenty-five years. There have always been extremists—those who used it too freely, and those who refused to use it under any circumstances. Alcohol is just as good and indispensable a drug as mercury or digitalis, and if people were in the habit of taking mercury or digitalis to excess we should have societies for their suppression, and volumes of literature which would go to prove that neither mercury nor digitalis was any use at all. As regards alcohol, it is not the use we object to, but the vile abuse, and it is undoubtedly a very good thing to see that its consumption is tending all the time to decrease.

It is with reluctance that I feel compelled to pass over the many recent advances in bacteriological science, but let me draw attention to the wide field for investigation and distinction that still remains for somebody. Although so much is known about many diseases, there is a list of specific infections which, like the poor, we have always with us, whose micro-organisms have not yet been discovered. They are still on the list of the " Wanteds," and include amongst their number such familiar friends as mumps, measles, chicken-pox, rheumatism, small-pox, and a host of others. That they are caused by the presence in the body of some micro-organism is almost beyond doubt, but so far they have eluded the search of many careful investigators. Possibly the reason is that they will not take the stains that have been tried upon them, or possibly they may be too small to be demonstrated by the microscope ; but that they will be found some day is almost as certain as that the others have been found, because we have an army of untiring, conscientious, and enterprising workers who keep as constantly on the track of these mischievous little demons as a bloodhound on the trail of a criminal ; and when some generous citizen endows a research laboratory in Auckland it is more than likely that an Auckland bacteriologist will be responsible for the discovery of at least one of them.

Another great advancement in medical science is in vaccine therapy. The use of the term " vaccine " is rather unfortunate, because the lay mind is apt to confuse it with vaccination. A vaccine is the suspension of a known number of sterilized bacteria in some neutral fluid. This is injected hypodermically, and acts by stimulating and reinforcing all the natural defensive mechanisms of the body. It produces an increase in the formation of anti-bodies, so that a person who has received proper vaccine treatment is enabled to manufacture sufficient of these protective substances to neutralize the poison by which he is infected, and so lead to his recovery. It is distinguished from serum therapy, which consists of a substance which is introduced into the body which either acts as an antidote to the bacterial toxines circulating in the blood, or, in some cases, has a direct effect upon the bacteria themselves. In the case of vaccine therapy it is clearly necessary that all the bacteria that are responsible for the malady should be attacked : *e.g.*, a person suffering from pneumonia—primarily the micro-organism was *Bacillus pneumococcus ;* in quite a large number of cases there are others as well ; and if your attention is directed to *pneumococcus* alone the others will go on thriving and the patient's recovery will be retarded. If *Bacillus* *streptococcus* is present, and any others which happen to be present are attacked simultaneously with the first one, it is amazing how rapid is the improvement.

There can be no manner of doubt that many of you who are at present before me now would not be here if it were not for vivisection. Some of you have had diphtheria and have been cured by antitoxin; others have had other diseases that have been cured by knowledge gained through vivisection.

Some of you have not had smallpox because you have been vaccinated from calves that have had it. Some of you, although you have been in districts infected formerly by fatal diseases, such as yellow fever, malaria, &c., have returned sound and well, because the advancement of medical science has been such that the carriers of those dread diseases have been tracked to their lairs by medical men of unfailing energy, careful observation, and indomitable courage, who have shown their professional brethren how to guide and instruct their patients how to live in those pestilential lands and yet avoid contracting the disease.

That great engineering undertaking, the Panama Canal, which is now practically completed, could never have been carried to a successful issue but for the scientific work done by the medical profession. You have only to remember your history to realize that all former attempts to colonize and work on the Panama Isthmus by whites were rendered impossible by the ravages of malaria and yellow fever. Honour is due to a whole phalanx of medical scientists who unravelled the mystery of these diseases, and sheeted the blame to a busy little mosquito. Swamps were drained and cleared, and with the disappearance of the mosquito the diseases made their exit, and the white man was able to proceed with impunity.

When a case of typhoid fever breaks out the medical man immediately hunts for the cause, and will not rest till he has found an untrapped drain, or something else, and has had it put right—very often getting much blame and incurring the everlasting hatred of the landlord.

Within the last few weeks an epidemic of infantile paralysis has visited Otago district. Sixteen cases have been traced, many of which have one or other lower limb affected; one the muscles of the eye; and one which ended fatally with meningeal symptoms, although, as no post-mortem examination was allowed, there is some doubt regarding this last case. Unfortunately this disease is not notifiable. There was a similar epidemic twenty years ago, when cases appeared from the north to the south of these Islands—twenty-one cases being in Dunedin—and Dr. Fulton stated that there have been one or two cases each summer for the last three years. Dr. Champtaloup, who has kindly furnished me with notes on the Dunedin cases, has observed that the cases usually follow very hot, humid weather. Last year there were three cases, one of which terminated fatally with marked degeneration of the cord. No doubt our bacteriologists will find out the cause, and thus enable relief to be given before so much damage is done as to injure the limbs of these children.

In the field of anaesthetics there has been of late years such an advancement that it is desirable at the next Congress that a special Section of that branch of medicine should be instituted. Thanks to the energies of John Snow, the use of anaesthetics has emerged from empiricism to such a position of exactitude as to render the production of anaesthesia not only much safer for the patient, but very much more comfortable for the operator.

Racial Decay.—In these get-rich-quick times the all-absorbing topic that engages the mind—not only of our own peoples in these young States, but of those of the older communities—is the accumulation of wealth and the enjoyment of luxury. Quoting from Octavius Charles Beale's excellent work, "That men decay disturbs very slightly our slumbers, and our Parliaments do not appear to find it worth attention." The medical journals in England and in these States have for years demanded an investigation into quackery by Royal Commission. The worst phase of quackery is the teaching and practice of limitation of families. As pathological study is indispensable to the treatment of disease, so the work of such a Commission could not fail to present a statement of this the greatest possible national trouble, for according to the *Lancet* quackery has destroyed more in Great Britain than the sword, famine, and pestilence united, and never was there a period in the history of British medicine at which the force and truth of this opinion was more obvious than at this day. To quote from Dumont, "History presents more than one example of this sort of social consumption. In the midst of peace, of abundance, and of security of all that would appear bound to sustain life and vigour, a race sinks into oblivion. It was fecund, it becomes sterile; it was valorous, it becomes cowardly; it was victorious, and it ends by being vanquished. That an enfeebled State should be destroyed by one more powerful is surely a simple matter. But a more terrible and more mysterious phenomenon is this spontaneous debility, this sort of anaemia which secretly invades a people and noiselessly undermines it. It is a spectre ambushed in the shade, which kills civilizations, and which is waylaying our own. What cause exhausted Greece after the conquest of Asia? How was Italy emptied of inhabitants after having subjugated the ancient world, and how was her population enervated?"

It is sometimes well to take the advice of Burns to see ourselves as others see us. So let us consider what Roger Williams, F.R.C.S., of London, has to say:—

"For a young country the social evolution of Australia has of late pursued a peculiar course. Its immense territory is occupied by a mere handful of people, some 3,750,000, of whom the great bulk are clotted in a few large towns on the coast of a temperate region, where the style of living emulated is that of the capital cities of Europe. Under the influence of socialistic ideas immigration is discouraged, although the declining birth-rate has already fallen to such an extent as to endanger the future of the race. Thus the population is almost stagnant, and it contains an unduly large proportion of adult and elderly persons. Under this concatenation of artificial circumstances, and with the aid of the lavish expenditure of borrowed millions, a high standard of individual material comfort has been attained in this "workers' paradise." Owing to the cheapness of meat and the gluttonous habits of the people the amount consumed per head is exceedingly high. Under these circumstances the tubercle mortality had diminished, while the evidence of cancer has greatly increased. In New Zealand, where the conditions of existence and social evolution resemble those of Australia, the leading morbid tendencies are also somewhat similar. Cancer and insanity have increased and are increasing, while tubercle is declining. The people are prosperous with a diminishing birth-rate, and immense quantities of flesh food are consumed."

The disciple of Aesculapius may be compared to a wayfarer who sets out upon an unknown journey. His path leads him through dark and unexplored regions which can only be revealed to him by his actually treading the road of his journey. Most of those from whom he inquires the way cheerfully render him every assistance, thereby cheering him on his way, till at last he sees the writing, " Ye shall know the Truth, and the Truth shall make you free." To those of us who, through wasted hours and lost opportunities, have chosen to remain ignorant Nature appears as a capricious tyrant, and her operations as a constant warfare between opposing forces, while life itself seems " but an empty dream." To those of us who are diligent and care to make inquiry, Nature reveals herself as a beneficent power working by immutable law with a constancy that knows no change. Science teaches us how to subjugate the forces of Nature to the service of man, and how, by a course of life and conduct in harmony with Nature's laws, the wise may exercise dominion where the ignorant are slaves. By the exercise of unfaltering courage, untiring industry, unbiased judgment, and unwearied patience we may hope to gain instruction from the works of Nature, from the beauty of her art, as well as the wonder of her power ; and the more we know the higher we shall rise, till we gradually approach the source of all light and win that power and freedom which are the vital secrets of knowledge and the reward of every true and faithful man.

VOTES OF THANKS.

Dr. J. B. MacDonald (Chairman of the Central Council of the British Medical Association, London) : Your Excellency, Mr. President, ladies, and gentlemen, I have to bring to this Congress the most cordial and friendly greetings from our brethren beyond the seas. Though I bring those greetings a great deal further than from Australia, I must say that in crossing the ocean, unlike some of our Australian friends, I have not had one bad minute. The journey has been a joy throughout, and it seems to me that the joy is culminating in Auckland. I expected to find a lovely country, and the realization is greater than my expectations. On returning to England I shall express to my friends there, and to the Council of the British Medical Association, my appreciation of the cordial manner in which I have been received in these dominions and at the Congress. The duty which has been entrusted to me is one which I consider a very great honour. It is to propose that the thanks of this Australasian Congress of Medicine be given to His Excellency the Governor for attending its opening proceedings and performing the inaugural ceremony. The presence of His Excellency on this occasion, and the presence of the Governor-General of Australia on previous similar occasions, is evidence to me that the medical profession is, at least to some extent, coming into its own. For it is an unfortunate fact that until a few years ago the medical profession was almost an unrecognized body—I do not mean individually, because we all know that our patients are grateful for what we do in the relief of pain and suffering—but I mean in a public way, as an institution. We may well feel intense pride at what our profession has done for the advancement of civilization, and what it has done, for instance, to make possible the construction of that great international highway of commerce of which our President has spoken—the Panama Canal. So I say that a Congress of medical men is one which is well worthy of the attendance of the ruling powers of the nation. At the same time we must recognize the fact that any one occupying such a position as that of Governor of this country must have innumerable calls upon his time. It is no easy matter for him to get away from his official duties to perform such a function as His Excellency has undertaken to-night. Recognizing that fact, I have to propose to you that this Congress of medical men gives a cordial vote of thanks to His Excellency for opening its proceedings.

Motion put, and carried by acclamation.

His Excellency, in acknowledging the vote of thanks, said it was only right that those who were sent by His Majesty the King to represent him in the dominions of the Crown should assist by their presence and support in the furtherance of the work of institutions in which His Majesty and his Advisers took deep interest. He was glad to see on the platform representatives of the Medical Staff of His Majesty's Navy, remembering as he did the records of the services rendered by the Navy Medical Staff in Auckland just fifty years ago to the wounded soldiers and civilians who were brought into the town from the seat of the Maori War. He was pleased to be associated on the platform with the First Minister of the Crown in New South Wales. He had the warmest recollections of the hospitality shown to him in the principal cities of Australia when he was on his way to New Zealand to take up the duties of Governor, and he was glad to have the opportunity of now publicly acknowledging that pleasant experience in Mr. Holman's presence. He was very pleased and proud to have been able to be present at the inaugural meeting of the Congress.

Dr. F. Antill Pockley proposed a vote of thanks to the President for his very interesting address.

The motion was carried by acclamation, and briefly acknowledged by the President.

Cable Message.

The following cable message was forwarded to His Majesty's Government in London :—

"Auckland, N.Z., 10th February, 1914.

"That this Tenth Session of the Australasian Medical Congress fully assembled begs to tender to His Majesty's Government its most sincere thanks for the hearty congratulations conveyed to the inaugural meeting by His Excellency the Governor of the Dominion of New Zealand. Such kindly thoughts help to strengthen the bonds of Empire. The views expressed in the message have been very gratefully received by the members of Congress, who sincerely hope that the outcome of work done at the present session of Congress will in some measure help His Majesty's subjects in Australasia in relieving their sufferings, promoting their welfare, and in prolonging their lives."

FINAL GENERAL MEETING.

THE final general meeting of the Congress to deal with matters of business was held at the Auckland Normal School on Saturday, 14th February, the President in the chair.

BRITISH MEDICAL ASSOCIATION.

Dr. YOUNG (Wellington) reported that at a meeting of the Council of the New Zealand Branch of the British Medical Association it had been resolved to recommend "That membership of future Congresses be limited to members of the British Medical Association." The reason for arriving at that conclusion was that there was considerable overlapping in the work of the two bodies, and most of the members of Congress were also members of the British Medical Association. The simultaneous meeting of the Branch of the Association and of Congress entailed a considerable increase of work upon the officials of the Association. For example, during the present Congress the Council of the Association had met every morning at 8.30 o'clock, and that meeting had been followed by a meeting of the Branch as a whole, which overlapped the time when its members ought to be attending to the business of Congress. If the whole of the business were done by one body there would be considerably less work, and the Congress could be run more efficiently. Congress was not a permanent body, and, as had been seen in dealing with the question of syphilis, it was necessary to remit political medical questions to the Branches of the British Medical Association. The whole realm of preventive medicine came under the heading of political medical questions. It had been objected that Congress was merely a series of scientific meetings, and that political medical matters were not its concern; but at the present Congress there had been discussions on such questions as eugenics, town-planning, and contract practice, all of which came under that heading. He had much pleasure in moving, in accordance with the recommendation of the Association, That membership of all future Congresses be limited to members of the British Medical Association.

The Hon. Dr. NASH (Sydney) raised a point of order—that it was not competent for the present meeting to come to a resolution on the subject which would be binding, seeing that there had not been due notice of the motion. This was a matter sprung upon the Congress at the last moment, and such a drastic proposition should be within the knowledge of the members of the British Medical Association throughout Australasia before it was dealt with. There was only a small attendance at the present meeting, and it would be injudicious for the members present to force their will upon the members of the British Medical Association throughout Australasia. It was quite possible that the whole Australasian membership of the British Medical Association might not fall in with the idea.

Dr. WORRALL (Sydney) said there was precedent for the motion before the meeting. At the Melbourne Congress he moved a similar resolution without any notice whatever, first asking Professor Allen, who was in the chair, whether he was in order. The Professor ruled that he was, and the discussion proceeded. The motion was opposed by Professor Allen himself, Mr. Syme, Dr. Barrett, and others, but those gentlemen now saw that the circumstances had altered, and that the proposal would be entirely in the interests of the profession.

The PRESIDENT intimated that he had formal notice that the motion would come forward, and the Standing Orders had been complied with. He would therefore accept the motion.

Dr. PURDY (Wellington) seconded Dr. Young's motion. He pointed out that the smallness of the attendance was not the fault of the members who were present. In any case it might be said of any of the meetings of Congress that there was not nearly a full attendance of members. The motion dealt with a matter which had been a burning question with the profession ever since the first Australasian Congress, and the sooner it was settled the better. Seeing that some 98 per cent. of the members of the Congress were members of the British Medical Association it was absurd to say that they should not run the Congresses themselves. There was no reason why they should not, and there were a great many considerations which made it almost imperative that they should.

Dr. POCKLEY (Sydney) said there was no more loyal member of the British Medical Association than he was, but at the same time he could not support the motion. He objected to it not on grounds of expediency, but as a matter of principle. The Australasian Medical Congress, representing the whole profession, was a much greater thing, and much more dignified, than a Congress of any Association could be. But coming to material matters, he pointed out that if the Congress were limited to a section of the profession it was doubtful whether it would receive from the various States the concessions it now enjoyed, such as the printing of its Transactions. In his own State there was another Medical Association. He did not consider it equal to their own Association, but still its members, in the eyes of their Government, had certain rights, and it was doubtful if the Government would grant the Congress its present privileges if it merely represented the British Medical Association. The biggest Medical Congress in the world, the International Congress, invited Associations from all parts of the world. The only qualification for its membership was the holding of a medical diploma. Another point was the fact that the British Medical Association had enough work ahead of it, in the combating of the socialistic medical schemes that were being brought forward, without adding to its labours the enormous work of running the Congress. Again, it did not seem right to tie the hands of the members of the profession in Brisbane, who were to be the hosts of Congress at its next gathering. They ought to be allowed to say whom they would include in the Congress. There were a large number of reputable practitioners in Queensland who did not belong to the British Medical Association, and it might not suit the Brisbane Executive to restrict attendance at the Congress to British Medical Association members. He moved, as an amendment, That the Queensland Branch be allowed to decide the question whether or not the Congress shall be confined to members of the British Medical Association.

Dr. DIXSON (Sydney) seconded the amendment. Seeing that he was amongst the few men who in the first instance joined together to form the New South Wales Branch of the British Medical Association, he thought he would be admitted to have considerable interest in the welfare of that Association, but he felt that Dr. Pockley's arguments were very cogent. It must be recognized that a great many people outside the profession regarded the British Medical Association—wrongly, he considered—as a club, and any representation which emanated from a Congress that was restricted to members of that Association would have less influence than the recommendations of the Congress as at present constituted. The wiser course would be to allow the matter to stand over for discussion at the next Congress, three years hence, and then have it finally decided, after every member of Congress and of the Association had had the opportunity of giving it careful consideration. It was desirable that the Congress should represent the whole profession. If it was to be confined to the British Medical Association that would not be the case, even if 95 per cent. of the members of the profession belonged to that body.

Dr. HAYWARD (Adelaide), speaking as Chairman of the Federal Committee of the British Medical Association in Australia, said that at its last meeting, held a week ago, the Committee received resolutions from various Branches somewhat similar to that now proposed by Dr. Young. The conclusion the Committee had arrived at was that it was desirable that the British Medical Association should hold its biennial meetings, and that it should be left to the Brisbane Congress to decide whether future Congresses should be merged in the gatherings of the British Medical Association. He suggested that Dr. Young's motion should be withdrawn with a view to giving effect to that idea.

The Hon. Dr. NASH (Sydney) pointed out that the Council of the British Medical Association in New South Wales had done very hard work in the past, and also had a great struggle still ahead. As a member of Parliament he could say that if Congress passed the present motion it would shut itself out from the support of every Government on the mainland of Australia. Then, as to finance, though the profession in New South Wales formed the strongest medical body in Australasia—certainly in regard to numbers, and probably also with respect to wealth—they had had to levy upon the members personally for the financing of the Sydney Congress, and even then they were unable to do without the aid of the Government to the extent of many hundreds of pounds. The Government helped in the way of entertainment of guests, the printing of the Transactions, and in other ways—probably to the extent of £1,500. The British Medical Association, without Government assistance—which would certainly be withheld—could not carry the Congress on its shoulders. In New South Wales the Association might find itself " at holts " with the Government at any moment, favourable though the Government of the moment was to the profession. It appeared to him that if the motion was agreed to the Congresses would degenerate.

A MEMBER : Never.

The Hon. Dr. NASH said the members would have to levy upon themselves for three times the amount that was levied now.

A MEMBER : And we will do it.

The Hon. Dr. NASH said it did not follow that because the levies were made they would be responded to. The experience of the British Medical Association in England, which had been related by Dr. MacDonald, proved that. They would not get a shilling from any Government if the Congresses became merely British Medical Association gatherings. Though the British Medical Association were doing wonderful work, he did not want to saddle them with an undertaking which they could not carry out.

Dr. SINCLAIR GILLIES (Sydney) said the question was whether the profession were prepared to take the risk of losing Government assistance and having to finance their own Congress. He considered that they were both able and willing to do that; and, that being so, he failed to see what good could be done by postponing the passing of the resolution until Congress met in Brisbane. He thought the time had come when they were ready to make membership of the British Medical Association an essential condition of membership of the Congress.

Dr. WORRALL (Sydney) said that if the Hon. Dr. Nash was the power behind the thrones of the various Governments, that settled the matter of Government assistance, but on other occasions he had heard that gentleman make equally dogmatic statements which subsequent events had not borne out. All the arguments that had been raised against the motion were puerile in comparison with the great argument that union was essential to the welfare of the profession. If the Congresses became British Medical Association Congresses, that union would be cemented and strengthened. Once they decided to make these gatherings British Medical Association Congresses there would be no other Australasian Medical Congress, and the Governments would be bound to recognize it as the expression of a united profession. To say that the Congress would lose dignity by being limited to members of the British Medical Association seemed to him madness.

Dr. LOCKHART GIBSON (Brisbane) moved, That the motion be amended to read, "That all future Congresses be Congresses of the British Medical Association." While he was largely in sympathy with the view held by Dr. Pockley, the general feeling of the Branches seemed to be in favour of the limitation to the members of the British Medical Association. He agreed that the profession ought to be prepared to do its own financing. Personally, he objected to the Governments printing the Transactions of Congress. It generally meant that the Transactions came out two years late, when many members had lost interest in the proceedings.

Dr. WORRALL seconded the amendment.

The PRESIDENT reminded Congress that according to its rules of procedure it was competent for a member, when it was considered that a question had been sufficiently discussed, to move that the question be put at once.

On the motion of Dr. LOCKHART GIBSON, seconded by Dr. CLARENCE READ (Sydney), it was agreed that the question be put at once.

The amendment, "That all future Congresses be Congresses of the British Medical Association," was then put, and carried by a large majority.

SMALLPOX.

Dr. SINCLAIR GILLIES (Sydney) brought up the report of the combined Sections of Medicine, Public Health, and Pathology upon the recent smallpox epidemic, as follows:—

> At a combined sectional meeting of the Sections of Medicine, Public Health, and Bacteriology, held on the 13th February, to

discuss the diagnosis of smallpox and the best means of preventing the spread in the light of experience gained in the recent epidemics in New South Wales and New Zealand, the following resolutions were passed and referred for endorsement to full Congress :—

"Firstly, that in the opinion of this Congress the epidemic which recently visited Australia and New Zealand was undoubtedly one of smallpox." (Carried with one dissentient to twenty-nine in favour.)

"Secondly, that, taking into consideration that this disease has been introduced and that it will be very difficult to eradicate, this Congress strongly urges the various Governments of Australia and New Zealand to enforce universal vaccination and revaccination as the only practical method of stamping the disease out." (Carried unanimously.)

Dr. SINCLAIR GILLIES moved, That Congress endorse the report.

Motion seconded by Dr. E. ROBERTON (Auckland), and agreed to.

SYPHILIS.

Dr. COLLINS, Chairman of the Special Committee on Syphilis, moved, That the report of the Committee, and the memorandum and resolutions which had been adopted by Congress, be remitted to the Government of the Commonwealth of Australia, the Governments of the various States in Australia, and the Government of New Zealand, at as early a date as possible.

Motion seconded by Dr. BARRETT (Melbourne), and agreed to.

Dr. COLLINS also moved, That a permanent Commission on Venereal Diseases be appointed by Congress, to guide arrangements for the production of reports, and act as an advisory body to the Executive of Congress ; the Commission to consist of—Chairman, Dr. W. E. Collins (Wellington) ; Victoria—Dr. W. J. Barrett, C.M.G., Dr. Robertson, Sir H. B. Allen ; New South Wales—Dr. Worrall, Dr. Molesworth, Dr. P. Fiaschi ; Queensland—Dr. S. Lockhart Gibson, Dr. Turner, Dr. Espie Dodds ; South Australia—Dr. Newland, Dr. Poulton, Dr. Martin ; West Australia—Dr. Atkinson, Dr. Ramsay, Dr. Pope Seed ; Tasmania—Dr. Sprott, Hon. G. Butler, Dr. Hogg ; New Zealand—Dr. W. E. Collins, Professor Colquhoun, Dr. A. Challinor Purchas, Dr. Hardie Neil ; South Sea Islands—Hon. G. W. Lynch, Suva ; General Secretary, Dr. Hardie Neil, Auckland.

Motion seconded by Dr. BARRETT, and agreed to.

Dr. Collins was appointed Chairman, and Dr. Hardie Neil Convener, of the Commission.

CONTRACT PRACTICE.

Dr. W. C. W. McDOWELL (Auckland) moved, in accordance with the report of the Contract Practice Committee, That this Tenth Session of the Australasian Medical Congress reaffirms the income-limit clause as defined by the Eighth and Ninth Sessions of Congress.

The clause referred to reads as follows : "That no medical man should pass for admission into any friendly society, lodge, club, or association for professional attendance at contract rates of remuneration any person whose income from all sources, together with that of his wife (if any), exceeds £4 per week—that is, £208 per annum. Further, no medical man should attend professionally at contract rates any member of the above-mentioned organizations whose income from all sources, together with that of his wife (if any), exceeds the sum of £6 per week—that is, £312 per annum."

Motion seconded by Dr. CLARENCE READ (Sydney), and agreed to.

PROBLEM OF THE FEEBLE-MINDED CHILD.

Dr. BEATTIE (Auckland) brought up the following resolution adopted by the combined Sections of Children, Psychological Medicine, and Subsection of Medical School Inspection, and moved, That the resolution of the combined Sections be adopted by Congress.

Motion seconded by Dr. WILLIS (Sydney), and agreed to.

RECOMMENDATIONS TO CONGRESS FINAL MEETING.

Proposed by Dr. J. SANDISON YULE (Melbourne), and seconded by Dr. SWEET (Auckland),—

That this meeting of the combined Sections of Psychological Medicine, Public Health, and Diseases of Children respectfully urge Congress to recommend to the State Governments of Australia and the Government of the Dominion of New Zealand that they take into consideration, with a view to legislation at the earliest possible moment, the final recommendations of the report of the Congress Committee on the Care of the Feeble-minded, viz.:—

(1.) Day schools in large centres to train all children reasonably suspected of mental defect. These will eliminate children wrongly classed as such, and qualify them for further education through the ordinary channels. The identification of the rest they would confirm.

(2.) Residential schools for children of the same doubtful class from scattered districts and for children definitely judged to be mentally defective. Classes of the type found most successful in other lands will be here available for the purpose of completing the children's training, both manual and scholastic, so far as the latter is found to be desirable and useful. In this class may also be mentioned the small paying schools. It will be necessary to provide for the mentally defective children of the more well-to-do parents, when the latter are unable to provide satisfactory care and control at home. These institutions could be worked either separately or in conjunction with the non-paying school.

(3.) In connection with the residential schools to some extent, and probably also by preference in separate country localities, residential colonies with separation of the sexes for the permanent care of the feeble minded on attaining adult age when not of so low a grade as to call for confinement in such institutions as idiot asylums. The detention of mental defectives in these colonies will, of course, presuppose adequate legal safeguards to avoid any possibility of error; this could be further provided against by periodical inspection. Moral defectives might be dealt with to a large extent by these institutions, or might require some special provision. Such colonies exist in England and America, but are handicapped by the want of legal power to detain. This should certainly be granted, as otherwise the worst cases from the point of view of the community would have to be allowed to roam at large.

The consensus of opinion of all who have seen the colonies in operation is that the feeble-minded are far happier as well as safer in them than when left to the mercy of ignorant parents or a world which has too much to do to make allowances for them or prevent their misconduct or disaster. The expense of instituting the colonies would undoubtedly be large, yet truly economical when the present expenditure on misdealing with the feeble-minded in gaols and charitable institutions is weighed in the balance.

By such means alone can the State hope to prevent the feeble-minded forming the large proportion they do of our habitual criminals, drunkards, prostitutes and wastrels, and thus alone with propriety can they be prevented from propagating their undesirable type in the make-up of future generations.

> Proposed by Dr. C. G. Godfrey (Melbourne), seconded by Dr. G. H. Butler (Brisbane), That existing Committee on Care and Control of Feeble-minded, with the State representatives, be reappointed, with power to add to their number.
>
> Dr. Butler, in seconding the motion for reappointment of the Committee, said that through want of sympathy and hesitation on the part of the authorities in Queensland they had not been able to take a very satisfactory census there, but he was sure that once the Education Department was convinced that a census through school-teachers was reliable a complete census would be taken in Queensland also. The Director of Education had practically promised this.
>
> Proposed by Dr. R. M. Beattie, seconded by Dr. C. S. Willis, and passed unanimously, That a very hearty vote of thanks be accorded to Dr. J. Sandison Yule, Hon. Secretary of Committee, for his labour in preparing such an exhaustive report.

Dr. Beattie moved, That the Committee on the Care and Control of the Feeble-minded be reappointed, with the addition of the name of Dr. Truby King, and with power to add to their number.

Motion seconded by Dr. Litchfield (Sydney), and agreed to.

PUBLIC HEALTH AND SCHOOL-INSPECTION.

Dr. Monk (Auckland) moved the adoption by Congress of the following resolutions passed by the Section of Public Health and State Medicine :—

> (1.) Proposed by Dr. J. Grieg, seconded by Dr. Harvey Sutton, That it be a recommendation that at future meetings of Congress there be a full Section of School Medical Inspection and Hygiene.
>
> (2.) Proposed by Dr. Willis, seconded by Dr. J. Grieg, That this Section is of opinion that the medical inspection of school-children be extended to all school-children not attending State schools, and that the Congress be asked to bring this resolution before the Governments of the various States of Australasia.
>
> (3.) Proposed by Dr. Willis, seconded by Dr. Patterson, That the thanks of this Section be accorded to Congress for instituting a Subsection for School Medical Inspection and Hygiene.

Dr. Willis (Sydney) seconded the motion. He said that in Australasia the medical inspection of schools was a comparatively new movement, but it had gone ahead by leaps and bounds. If Congress recognized that branch as being worthy of a special Section it would increase the dignity of the work both in the eyes of the members of Congress and those of the general public. New South Wales had twelve State medical officers, and would shortly have more, and he thought the practitioners in this branch of medicine were numerous enough to have a special Section.

The President pointed out that under the rules of the Congress the whole of the business management was left to the Executive. It might decide to have thirty-two Sections, as was the case at the International Congress in London, or it might have only two. If Congress was to meet in the smaller towns it was wise not to have too many Sections. That was why he had not thought it wise to ask the Brisbane Executive to have a Section on Anaesthetics, though he considered that it would be desirable to have one. He did not think that future Congresses should be compelled to have a Section on any particular subject.

Dr. BARRETT (Melbourne) was in sympathy with the resolution with regard to school medical inspection, but thought it would be advisable to make it less mandatory.

Dr. WILLIS agreed to alter the resolution so as to read, " That it be a recommendation of this Congress that at future meetings of Congress there be a full Section of School Medicine and Hygiene."

The first paragraph was accordingly amended in this direction, and in altered form was agreed to.

Speaking to the second paragraph,

Dr. CLARENCE READ (Sydney) said he considered that this was a very serious matter. It was the starting of the driving of the wedge of the nationalization of medicine. A certain number of private schools already had their private medical officers, who did their work most thoroughly, and carried out a system of medical inspection far in advance of that of the Government of New South Wales. If the proposed resolution were sent to the Governments, these men's jobs would be cancelled, and whole-time men would be employed.

Dr. WILLIS said that in New South Wales the Government Medical Inspectors inspected all schools that elected to come under the system. There were more than three hundred thousand children in the schools of that State, and only about seven thousand were outside the Government medical-inspection system. It was not proposed to interfere with any medical man's present arrangements. The Government medical officers did not interfere with any such schools.

Dr. READ said that the officials had come to privately conducted schools and asked their conductors to accept Government examination, which he thought was scandalous.

Dr. WILLIS said the Department had circularized every school in the State. In issuing such a circular they could not well omit any school. They did not expect the schools that were already inspected to come in—in fact, they knew that such schools would not. They did not want any school that already had an inspection system. So far from interfering with the profession, they were increasing the professional work. It was recognized that a certain proportion of school-children were suffering from minor defects, and it was desirable that those defects should be ascertained and treated before they developed into something worse. From the national point of view the Department must take the matter up, but it did not want to interfere with the business of the medical profession.

Dr. THOMAS (Sydney) thought the recommendation was too drastic. Dr. Willis and those associated with him could easily avoid friction with the profession by sending circulars to the school authorities stating that if the school was not already inspected by a private medical officer—whose name in that case they would be glad to learn—a Government medical officer would be sent to the school to examine the scholars. That would be the means of bringing about inspection of schools, and at the same time avoid interference with the schools where inspection was already provided for.

Dr. A. GRAHAM BUTLER (Brisbane) held that every school ought to be inspected. It was not reasonable to make inspection optional in some cases and compulsory in all the rest. What was absolutely necessary was that there should be some guarantee of the efficiency of the inspection, as to both the Government and the private schools.

He suggested that Dr. Willis and Dr. Monk should accept a recommendation somewhat on the lines which had just been suggested. That, he thought, would meet the wishes of both sides.

Dr. READ (Sydney) thought the question was far too important to be discussed in the time now at the disposal of Congress, seeing that most members were anxious to catch the Rotorua train. He proposed, as an amendment, That its consideration be deferred until the next session of Congress.

Dr. TURNBULL (Melbourne) seconded the amendment. He said that in Victoria the managers of schools were fighting Government inspection on other grounds than those which had been stated. If it was so valuable to have Government inspection as the school medical officers represented, then no school would be able to do without it; but it was not fair to force Government inspection upon private schools. It would be a pity to put so debatable a question to so small a meeting.

Dr. POCKLEY (Sydney) agreed that there was not time for the proper consideration of the motion. But what, in any case, was the use of the resolution? The Government of New South Wales was inspecting the schools of that State already, and Congress could not stop it from doing so in regard to the State schools. They should, however, hesitate before agreeing to a recommendation of Congress that all schools should be inspected by whole-time Government medical officers. Private schools should be allowed to make their own arrangements. For that reason he strongly supported the motion that consideration of the matter be deferred.

Amendment deferring consideration agreed to.

The third resolution was agreed to *nem. con.*

EUGENICS.

Dr. TRUBY KING brought up the following resolution passed by the meeting which he had addressed on the subject of "Eugenics," and moved, That it be endorsed by Congress:—

> That the Hon. Dr. Collins, Dr. Gibbs, Dr. Truby King, and Dr. Elizabeth Platts-Mills be appointed a Committee to wait on the Minister of Education and represent that, in the opinion of this Congress, it is in the highest interests of the whole community that the State should inculcate and bring about as far as feasible an ideal of education for girls, which (to quote the words of Professor Stanley Hall) shall "invert the present maxim that girls should be primarily trained to independence and self-support, and that matrimony and motherhood, if it come, will take care of itself." This Congress feels bound to deprecate any system of education which, under the stress of excessive mental effort, excessive competition, excessive straining after so-called accomplishments, &c., pays insufficient attention to ensuring normal, orderly, well-balanced development, and complete fitness for maternity, and the practical care of a home.
>
> This Congress is satisfied that, broadly speaking, even where marriage does not take place, the education which gives a girl the best all-round equipment in body, mind, morals, and inclination for home life and potential motherhood also gives her the soundest and surest foundations for future health and happiness, and for a sustained power of earning an independent living, if such should prove to be her lot.

Dr. AGNES BENNETT (Wellington) wished to raise a point of order. This resolution, she contended, was not carried by any Section of the Congress, but by a mixed meeting of medical men and lay people, at which a large part of the discussion was carried on by lay visitors. For that reason she submitted that it should not be put to the present meeting.

Dr. ROBERTON (Auckland) submitted that there was nothing to prevent Congress from considering the resolutions of other meetings. It would be a great discourtesy for Congress to invite people to hear a discussion and then refuse, because of their presence, to consider a resolution of the meeting they had attended.

The PRESIDENT said that the meeting of the previous Monday was a meeting of Congress, to which lay visitors were invited and admitted. Those visitors were instructed beforehand that only members of the Congress would be allowed to take part in the discussion—the others were mere listeners.

Dr. AGNES BENNETT: But they voted, sir.

The PRESIDENT said that the voting was done only by members of the Congress.

Dr. AGNES BENNETT said that she personally saw some members of the laity vote.

The PRESIDENT said that the gentlemen in question were honorary members of Congress, having been made so on account of their special knowledge of such subjects as eugenics.

Dr. TRUBY KING said that at the meeting it was pointed out that no woman was included in the proposed Committee as originally proposed. The reply was that the resolution was a transcript of one that was passed two years ago, and he had met the objection by agreeing to add the name of Dr. Elizabeth Platts-Mills to those already submitted. He understood that another objection that would be made was that the resolution was ambiguous. If it was desired, he would omit the quotation from Professor Stanley Hall, and alter that portion of the motion to read "That it is in the highest interests of the whole community that the State should inculcate a form of education of girls which would tend to safeguard and foster, and not to frustrate, all-round development."

Dr. CLARENCE READ (Sydney) asked whether Dr. King had any right to alter what another meeting had submitted to Congress.

Dr. TRUBY KING said he did not propose to do so. He only suggested a shortening of the resolution in case the meeting should desire it.

Dr. ROBERTON (Auckland) proposed to amend the resolution in the direction just suggested by Dr. Truby King.

Dr. WORRALL (Sydney) seconded the amendment.

Dr. AGNES BENNETT moved, That the passing of the proposed resolution be postponed till it could be further discussed. Its wordiness rendered it liable to serious misinterpretation, and made it unworthy of a place among the well-considered resolutions submitted to Congress as the result of the various sectional discussions. Any meaning might be read into the sentence about "inverting the present maxim." The second part of the resolution was so obviously trite that it would be almost an insult to the Minister of Education to put it before him. Practically it said that our system of education had been futile, and it did not seem right that the representatives of Congress should put such a statement before the Minister. If Congress did agree that the present system of education was futile it should say so in a definite resolution, and not in a verbose statement such as was liable to misinterpretation. Personally she would like to see great changes made in the education system, and especially in the education of women. She was anxious to see the introduction into the schools of the teaching of home science and the proper care of children. It would be unfair for a scientific body such as the Congress to take as proved the statement that the modern education of woman unfitted her for maternity and for the care of a home. The whole trend of Dr. King's address—which, though entitled "Eugenics," dealt entirely with the education of women—was in that direction, and if the proposed deputation went to the Minister of Education it must convey the same meaning to him. Another reason why the consideration of the matter should be postponed was that the Congress was met as an Australasian Medical Congress, and to single out the education system of New Zealand for attention was invidious.

Dr. HATHERLY (Wanganui) seconded the motion for postponement. He thought the resolution was too indefinite, and that it did not express the opinion of the whole Congress but only of a small section of it. Everybody knew that Dr. Truby King had the gift of eloquence, and was able to infect other people with his own enthusiasm. Such matters should, however, be considered calmly, and a pronouncement of this kind should not go forth as the opinion of Congress when it had merely been carried hastily by a small section of the members.

Dr. MARY DE GARIS (Tibooburra) supported the amendment. She agreed with the view of the original motion expressed by Dr. Bennett. Even in its shortened form its generality, its ambiguity, its length, the impossibility of remembering on coming to the end what was at the beginning, its numerous clauses, and its multifarious insinuations made a thorough understanding of its purport almost impossible. It was so general that its interpretation necessarily varied according to the mind of the reader.

After cries of "Vote" from the meeting, the PRESIDENT ruled that it was time to put the question.

The amendment deferring further consideration of the motion was put, and carried.

HOSPITAL ABUSES.

On the motion of Dr. ROBERTON (Auckland), the Committee on Hospital Abuses was reappointed, with power to add to its number.

NEXT SESSION OF CONGRESS.

Dr. W. N. ROBERTSON (Brisbane) moved, That the next Session of Congress be held at Brisbane.

Dr. BUTLER (Brisbane) seconded the motion, which was agreed to.

On the motion of Dr. LOCKHART GIBSON (Brisbane), seconded by Dr. BUTLER, the Hon. W. F. Taylor, M.D., M.L.C., of Brisbane, was elected President of that Congress.

VOTES OF THANKS.

Dr. POCKLEY (Sydney) moved, That a respectful vote of thanks be conveyed to His Excellency the Governor of New Zealand for his kindness in opening the Congress.

Motion seconded by Dr. THOMAS (Sydney), and carried.

Dr. LOCKHART GIBSON (Brisbane) moved, That a vote of thanks be given to His Excellency Lord Liverpool, Governor of New Zealand, for coming at considerable personal inconvenience to open Congress; to the Prime Minister and Minister of Public Health and Hospitals, for numerous facilities granted to the Executive and to the members of Congress, and for their kind speeches of welcome; to the Minister of Railways, for his assistance in travelling arrangements and in the granting of concessions on all railways; to the Ministers of Railways for the various Australian States, for concession and travelling facilities to the various members; to the Inspector-General of Hospitals, for his assistance in arranging for the entertainment of visitors; to the Anglican and Roman Catholic Bishops, and the Moderator of the Presbyterian Assembly; to His Worship the Mayor of Auckland and the City Councillors of Auckland, for their kindness in receiving and entertaining the members; to the President of the New Zealand Branch of the British Medical Association and to Mrs. Parkes, for the very delightful entertainment given to members; to the various readers of papers before full Congress—Dr. J. W. Barrett, C.M.G., Dr. Sinclair Gillies, Dr. J. B. MacDonald, Dr. Truby King, and Hon. W. A. Holman; to the Education Board, Auckland, for the use of the Seddon Memorial Technical College and the Training College; to Mrs. Parkes (President), Mrs. Grant (Secretary), and members of the Ladies' Committee; to Mr. George George, Director of Technical Education, and to Mr. H. A. E. Milne, Principal of the Training College, for much valued assistance; to the Union and Huddart-Parker Steamship Companies, for concessions to visitors; to the Auckland Racing Club, the Auckland and Northern Clubs, the Auckland and Remuera Bowling Clubs, the Auckland and Maungakeikei Golf Clubs, and the Working-men's Club; to the secretaries, Young Men's Christian Association, and the St. John Ambulance Brigade; and, finally, to the editors of the *New Zealand Herald* and the Auckland *Star* for the very excellent and full reports of the meetings of Congress.

Motion seconded by Dr. T. HAYWARD (South Australia), and carried with enthusiasm.

OFFICERS OF CONGRESS.

Dr. HAYWARD (Adelaide) moved, That a vote of thanks be given to the officers of Congress for their services. He thought the work they had done spoke for itself.

Motion agreed to.

Dr. POCKLEY (Sydney) moved, That a hearty vote of thanks be given to the President. Dr. Purchas had, as President, shown the utmost urbanity and tact, and proved himself to be the possessor of a philosophical temperament. In England a man's qualifications were generally summed up in the words, "He is a gentleman"; but in Australasia there was another expression which seemed to go further—viz., "He is a white man"—and that term could correctly be applied to Dr. Purchas. Dr. Pockley also spoke warmly of the work done by Mrs. Purchas in furthering the entertainment of the members of Congress.

The motion was agreed to, and cheers were given for the President and Mrs. Purchas.

The PRESIDENT having thanked the meeting on behalf of himself and his wife, Congress finally adjourned.

CONGRESS DINNER.

THE Congress dinner was held at " Cargen " on the evening of Thursday, the 12th February. About two hundred members and guests were present, including Hon. W. A. Holman (Premier of New South Wales), C. J. Parr, Esq. (Mayor of Auckland), and Dr. J. B. MacDonald.

The following was the toast-list :—

" The King " ; " The Government of New Zealand " : Dr. J. W. Barrett. Reply : Dr. T. H. A. Valintine, Inspector-General of Hospitals.

" Visitors " : Dr. W. C. W. McDowell. Reply : Hon. W. A. Holman, Mr. Hamilton Russell.

" British Medical Association " : Dr. F. Antill Pockley. Reply : Dr. J. B. MacDonald, Chairman of Council, London ; Dr. W. H. Parkes, President New Zealand Branch.

" Australasian Medical Congress " : His Worship the Mayor (Mr. C. J. Parr). Reply : Dr. A. Challinor Purchas, President of Congress.

" The Ladies " : Dr. Harvey Sutton. Reply : Dr. R. H. Makgill.

The Hon. General Secretary (Dr. B. J. Dudley) was presented by the members with a purse of sovereigns, a brief speech of appreciation being made by Dr. J. A. G. Hamilton (Adelaide), to which Dr. Dudley suitably replied.

ADDRESSES TO FULL CONGRESS.

PRESIDENTIAL ADDRESS IN MEDICINE.

By Sinclair Gillies, M.A., M.D. (Lond.),
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I have to thank the Executive of the tenth session of the Australasian Medical Congress for the honour they have conferred upon me by electing me to the Presidential chair of the Section of Medicine, and in requesting me to address full Congress. In doing so I would like to express my appreciation of the kindly thought that actuated them in their choice of an old Aucklander to fill so honourable a position.

In an address of this kind there is a great temptation to deal minutely with recent advances in some particular branch of medicine with which one happens to be specially concerned. Such a course, while appealing keenly to a few, would, I fear, have little interest for the majority of my hearers. Before such an assembly I feel it is better to take a more general view, which if lacking in clearness of detail may yet contain points of interest for all.

When, however, one approaches the subject of medicine in the twentieth century, one is appalled at the vastness of the theme, and the difficulty in deciding what features are worthy of selection for emphasis, and what may be lightly touched on or omitted. Where, too, are its boundaries, merging as it does, on this hand into surgery, on that into preventive medicine ; here physiology claims it as its own, there pathology, while yonder every specialty rises by gentle gradation from its field. Where should the story commence ? Back in the days of the venerated Hippocrates, paying tribute to the wisdom of the ancients, slavish respect of which by the profession delayed the coach of progress for many years ? Or should it deal with the most recent and unproved beliefs of those whose ignorance of history fails to remind them that what they extol so confidently has already been tried and found wanting ? Should it tell of heroes, of our triumphant onward progress in vanquishing disease, of the fields that are yet to win ; or should it whisper of our failures, of our blind reliance on unworthy guides, of the earthly nature of our heroes, of the weak spots rather than of the invulnerability of our armour, seeking how they may be strengthened ? Conscious of my shortcomings and inability to do justice to such a theme, I ask you to bear with me while I touch briefly on some of the more interesting and outstanding phases in the recent progress of our art.

During the latter part of the last and the beginning of this century advance in every branch of medicine has been enormous. New and unexpected fields have opened before our astonished gaze, and rich prizes have rewarded the labours of our pioneers. In no department has development been greater or more rapid than in that of bacteriology and preventive medicine, and from no other has humanity reaped a greater or more lasting harvest. The stimulus given by Pasteur, Koch, and Lister has produced a response in the large and enthusiastic army of workers devoting their lives to this subject to-day. And not alone now are they occupied with the bacterial plants which held the stage so prominently in the earlier days; the limelight to-day is on the *Protozoa*, their animal cousins. Perhaps the most conspicuous of recent developments in this field is the discovery of what have been termed the "ultramicroscopic or filterable viruses," those microbes so infinitely minute as to be beyond vision with even the highest-powered microscopic lenses, but whose existence is proved by the infectivity of fluids which have been passed through the so-called "germ-proof" filters—filters which surely retain microbes of ordinary size. It is to be noted that these filter-passers are by no means few in number—some thirty-eight varieties have been detected already. Nor are they concerned merely with rare or curious conditions; vaccinia (presumably variola), rabies, and yellow fever in man; pleuro-pneumonia, foot-and-mouth disease, and swine-fever in animals, are among those set down to their account. The labours of Landseer, Levaditi, Flexner, and Lewis have taught us that to this group belongs also the cause of acute infantile paralysis—a malady previously of rather mysterious causation. The causative organism has been recovered not only from the spinal cord and cerebro-spinal fluid, but also from the nasal secretion of patients and contacts, placing this crippling disorder of childhood among the infective and infectious diseases. Fortunately the tendency to infection is only slight, otherwise in the days of our ignorance wider spread would have occurred.

Of ordinary bacteria the two of most interest to us in this part of the world are the bacillus of Eberth and that of Koch, responsible respectively for enteric fever and tuberculosis. Enteric fever is fast disappearing from our midst, thanks to the recognition of its bacterial nature and mode of conveyance. Knowledge that in country districts the fly is an important factor in its spread has done much to minimize its incidence in places where water-carriage of excreta is lacking. So great has been the decreased incidence due to improved sanitation that some doubt the value of protective inoculation to those exposed to infection. In all medical problems so many varying factors are concerned that proof is often difficult, but, in spite of the general decrease of enteric throughout the civilized world, figures now available seem to show conclusively that protective vaccination against this disease is of great and lasting value, and should be practised in all districts and institutions where risk of infection exists.

Tuberculosis, the "great white plague" of Oliver Wendell Holmes, still bulks largely as a curse of civilized man, accounting in Great Britain for one death in every three between the ages of twenty and forty-five, the most active and productive periods of life, while in Australia some 3,700 persons die from it every year. Little wonder that at last the race is thoroughly aroused to its importance, and the need to use every effort, individual and collective, for its extermination. Though far from victory, much has already been accomplished. In England the death-rate from tuberculosis has been reduced to almost half in thirty-one years, while in the United States it has fallen from 4·9 to 1·9 per thousand, considerably less than half. It must be remembered, however, that during the same time the general mortality from all causes has fallen greatly, though not quite to such an extent. In America, between the years 1881 and 1912, the death-rate from causes other than tuberculosis has fallen from 26·1 to 12·1, a decrease approximating to but not quite so great as that from tuberculosis, leaving a margin of 7·3 per cent. as the lessened tuberculosis compared with the general death-rate.

The factors in this decrease are many and various: improved general hygiene, improved housing, improved standard of living, regulation of the sale and inspection of foodstuffs—especially milk—recognition of the necessity for fresh air and efficient ventilation by day and night, regulation of occupations exposing to irritating dust and gases; in fact, every advance in sanitation has had its share.

Of late the attack has been more direct. The danger lurking in the discharges of the consumptive is fully realized, and the impossibility of stamping out the disease without first exactly localizing its extent and habitat has been grasped. No greater proof of the change that has come over the attitude of the public towards the treatment of disease can be afforded than the fact that in February last pulmonary tuberculosis was made a compulsorily notifiable disease throughout Great Britain. What a contrast to the days, not so far distant, when medical secrecy and the inviolability of the confessions of the consulting-room were paramount! Now light must be let into dark places, and the good of the individual must bow to that of the race.

Preventive medicine is doing its part, and promises to do more; but what of active treatment of this disease? We are most of us agreed that the essential factors in the cure of tuberculosis are the same as those of prevention—*i.e.*, fresh air, sunlight, good food, and a contented and regular life. There many are satisfied to stop, allowing chance to decide the rest. Others recognize the salient fact that tuberculosis is an infective disease; that it maims or kills in two ways, partly by local destruction, as in the case of a joint or spine, but mainly by the debilitating effect of the toxins washed into the circulation from the infected centres. They recognize, too, that the amount of toxin entering the circulation varies from hour to hour, depending on the activity of the blood-flow in the affected region, and that it can be controlled to a great extent by intelligent use of rest and exercise. Immunization and arrest depend on suitably graduating the dose of toxin so as to stimulate as far as possible without overwhelming the defensive mechanism. Hence the growth of the well-equipped sanatorium, with its rigid rules regarding rest, exercise, and graduated labour, than which we possess at present no more potent cure. When we fully grasp this fact, the necessity to control as far as possible the output of toxin from the tubercular foci, and that a case of tuberculosis requires as much close attention and management as a case of enteric fever, we shall have gone far on the way to its arrest.

Another point in the treatment we have yet to fully realize is that cases must be diagnozed and treated at a much earlier stage than most of us were taught. The pre-physical sign stage of tuberculosis raised, and still sometimes raises, a smile of incredulity, yet we all recognize how few may be the signs in advanced cases, and how relatively large must be a lesion to produce the classic picture of our student days. The stethoscope is yielding some of its priority in diagnosis to the thermometer, the weighing-machine, the microscope, the fluorescent screen, and the specific reaction—the tuberculin test. Of the specificity and reliability of the tuberculin test there can at this time be no doubt. A definite reaction, be it ophthalmic, cutaneous, or subcutaneous, means that the individual so reacting has been sensitized by the reception of tubercular poison, and that he either has, or has had, a tubercular focus somewhere. That the focus is active there is no proof, as sensitization of the tissues remains for some time after the toxin has ceased to act. How long this sensitization lasts we are at present ignorant. In the case of the sensitization of the conjunctiva of non-tubercular individuals by the ophthalmic test, it may last, according to my own observation, for more than seven weeks; and from re-examinations made by Gelien and Hamman, of patients whose eyes had been sensitized two years before, it is possible that it may in exceptional cases persist for that time, though it has generally disappeared. Further work is required along these lines, and the adoption of a definite standard for applying and judging a local reaction to harmonize some of the conflicting results at present published. Where a patient can afford the time and expense of lying up and having his temperature carefully recorded, the original method of Koch is practically harmless, and the most reliable. Short cuts, such as injecting ambulatory patients who take their temperature when they feel feverish, are not to be commended.

In suspected cases, where physical examination is negative or leaves us in doubt, the fluorescent screen or X-ray picture may be of considerable assistance. Patients who present few or no clinical signs by the ordinary methods of examination frequently show on the screen and radiogram marked abnormalities in the form of differences of density on the two sides, mottling, enlarged bronchial glands with radiating striae, a small centrally placed heart, or differences in the movement of the diaphragm on the two sides.

The exact significance of these findings is not yet determined, and extended collaboration between the clinician and radiographer will be necessary before we are in a position to say with certainty which signs are indicative of active, which of obsolescent, trouble. Till we have more exact knowledge on these points, it is premature to claim that marked shadows at the roots of the lungs prove that the disease begins there and spreads outward rather than that they indicate an unusual glandular involvement secondary to a peripheral focus too minute to be detected by the screen. Already, however, enough work has been done to establish the claim of the X-ray picture to a place in the diagnosis of pulmonary disease.

In connection with treatment of this disease, I touch with some trepidation on the subject of specific immunization. It is twenty-three years since Koch first brought his old tuberculin before the profession, and since that date preparations too numerous to mention—of endo- and exo-toxins, bacillary emulsions, derived from human, bovine, avian, and reptilian tubercle, bouillion filtre, albumose free tuberculin, serum of immunized animals, &c.—given in doses varying from fractions of a millionth up to several milligrammes, in varyingly increasing quantities, at varying intervals, have had and still have their ardent advocates and equally strenuous detractors. Where we find a long list of drugs credited with the cure of any disease, we may assume, in the first place, that the disease frequently recovers, and in the second that none of the drugs is a satisfactory cure. So I fear it is with tuberculosis. Fortunately the tendency is to recovery, but no bacterial preparation has so far established its claim to cure; nor is this surprising when we recollect that up to the present there is no authentic record of animal experiments showing that tuberculin has ever cured an already infected animal. That it produces improvement in carefully selected cases, whether by directly stimulating the defensive mechanism or indirectly by its psychic effect, there is little doubt; but are we justified in relying solely on it, deluding ourselves and our patient with the belief that a cure produced in the surroundings in which the disease was contracted is likely to be more permanent? As reasonably attempt the resuscitation of a stoker suffering from heat-stroke in the stokehole rather than in the open air because, forsooth, he must ultimately resume his work below.

During the last few years treatment by the production and maintenance of artificial pneumo-thorax has been extensively tried, and is becoming the fashion. In advanced cases of unilateral disease it has, in carefully selected cases, shown excellent results, but its use in early cases is to be deprecated as unnecessary and not entirely free from risk. Saugman, whose results are very satisfactory, reserves it for advanced cases only.

Among diseases which, though fortunately rare with us, strike suddenly with dire results, cerebro-spinal meningitis has taken its place as a definite bacterial infection, and it is incumbent in every suspected case to clinch the diagnosis by lumbar puncture and examination of the nasal secretion. On discovery of the *Diplococcus intracellularis* Flexner's serum should at once be given intradurally. Recent figures show that in twelve hundred cases where it was used the mortality was reduced to 33 per cent., with a much smaller death-rate when the injections were made during the first few days of the disease. From a place disease, cerebro-spinal meningitis has entered the group of infective diseases demanding instant isolation, till the naso-pharynx is found free from *Diplococci*.

The *Protozoa* have long been known to us in the form of the intestinal amoebae and the malarial parasites, but the researches of recent years have revealed a host of others. We have abundant evidence of the existence of pathogenic *Sarcodines*, *Flagellates*, *Sporozoa*, and *Ciliates*, and something more than familiarity in the case of *Spirochaetes*. It seems not unlikely that many of the filterable viruses already mentioned belong to this group, and if the diseases caused by the visible ones—such as malaria, kala azar, sleeping-sickness—are chiefly of interest to dwellers in the tropics, the subject is still of importance to us all, not only practically, as in the case of syphilis, but also as affording the potential solution of the present uncertain etiology of some everyday diseases.

The importance of the isolation of the *Spirochaeta pallida*, and the application by Wassermann to the diagnosis of syphilis of the principle of the deviation of the complement, first enunciated by Bordet, can scarcely be overrated. We now have a reliable aid in forming a diagnosis in doubtful cases, one by which we are able to definitely incriminate syphilis as the cause of many disorders in which it has long been suspected to bear a part, and one whose application has shown how far-reaching and lasting are the ravages of this terrible yet preventable malady.

The disease is preventable, its effects far-reaching and horrible. What steps are we taking for its prevention? It is time that we divested ourselves of sentimentalism and prurient modesty, which drives the sufferer to hide the disease and deprive himself of efficient treatment, and that we set to work to stamp out this as we would any other contagious disorder. Let us hope that the efforts of the Royal Commission recently appointed in Great Britain will evolve some practical method of grappling with this terrible scourge.

One of the most significant and admirable acts of the delegates at the annual meeting of the British Medical Association at Brighton last year was their decision not to avail themselves of the right given under the Insurance Act to refuse to treat as part of their contract duties this and similar diseases.

Not the least important development of study along the lines just considered is the revelation of the rôle of ectopic parasites in spreading microbic diseases. In the fact that they should carry germs and inoculate them into us there is nothing remarkable except the slowness of our realization of the likelihood of such an occurrence. But having realized it very practical results have followed. Witness the history of Panama —that narrow neck of land dividing two mighty oceans, a land of pestilence, a veritable Golgotha and grave of great ambitions. What has rendered possible the joining of these two seas? But for the discovery of the plasmodium of malaria and the habits of its host the mosquito, but for the incrimination of the *Stegomyia fasciata* as the carrier and inoculator of yellow fever, and but for the enforcement of simple rigid sanitary precautions by the medical staff of the American army, that canal would still be a thing of dreams. Little does the world at large realize that Laveran and those who followed in his footsteps are making greater conquests and more effectually changing the map of the world than did Caesar or Napoleon.

Nearer home we have seen how plague, of old the terror of Europe, whose advent caused us more than slight alarm, once its bacillary nature was grasped and its transference from rat to man by fleas realized, lost its terrors and was quickly eradicated from our midst, not by sorceries and cruelty to our fellow-man, but simply by cleansing our slums and dealing death to rats.

The trend of recent research is to incriminate our daily pest, the fly, as the chief propagator of enteric fever, to say nothing of other diseases, and it is to be hoped the near future may reveal some practical way of minimizing this scource of danger. It would be gratefully received if only as the reduction of a nuisance.

I am conscious that in recalling to your memory the foregoing matters of public health I have been able to mention merely the more salient of the many instructive developments of recent years. No doubt there are others equally worthy of mention; indeed, it is difficult to know where to stop. But for the nonce we must take leave of the microbes, as there are other matters which demand our consideration.

The study of the internal secretions and the ductless glands has attracted many workers, and our knowledge on this subject has been considerably extended, though we are still only on the threshold. We now recognize that a gland may have both an external and internal secretion—that is, may produce not only a secretion which escapes through its duct, but also one which passes directly into the blood, circulating through the gland. This is readily demonstrated by ligature of the vas deferens in young animals, when, though the animal remains sterile, normal growth occurs. If, instead of the vas, the whole cord is ligatured, the changes seen in castrated animals are reproduced.

To these internal secretions Starling has given the name "hormones," and it is probable that the internal secretions of most glands consist of not one but several hormones, which, carried by the blood-stream, exert specific excitatory and inhibitory effects on varying organs and tissues. The maintenance of normal bodily health depends on the presence in the blood of a proper proportion between the numerous hormones circulating in it.

No longer can the blood be represented as consisting simply of corpuscles and plasma, the latter having a fixed content of albumen and salts. Hidden in it are numerous hormones, on whose interactions and fractional alterations depends the nutrition of our bodies, while every infection, however slight, leaves its mark temporarily or permanently in the form of specific anti-bodies.

The most important of the ductless glands are the thyroid, parathyroid, pituitary, and supra-renal, while internal secretions have been shown to be present in the pancreas and genital organs.

With arrest of thyroid secretion and the production of myxoedema we are all familiar, and also with the results of oversecretion—exophthalmic goitre—though whether this is an oversecretion of normal or pathological hormones, and of the cause of such oversecretion, we still are ignorant. That the hormones are secreted in varying proportions is rendered probable by the varying severity of the crises and symptoms occurring in this disease.

In our ignorance of the cause of such hypersecretion, our means of controlling and regulating it are unsatisfactory. Slight cases frequently respond to rest and adrenalin, while regular exposure to X-rays over a considerable period has given promising results, the chief objection to this latter method being that it renders more difficult subsequent removal of a portion of the gland, which in capable hands is admittedly the most successful treatment, however humiliating it may be to confess that we cannot decrease the activity of an organ without mechanically reducing its bulk.

The researches of Schaeffer, Cushing, Herring, and other workers have thrown much light on the structure and function of the pituitary body, and have established the fact that the secretion of the anterior lobe activates skeletal growth and sexual development, and controls the deposition of fat and the nutrition of the skin and nails, while that of the posterior lobe and pars intermedia regulates the tone and contractility of plain muscular fibre and of the heart, besides supplying hormones that stimulate the activity of the mammary gland and kidneys. The pituitary has a remarkable influence on metabolism, and is largely the cause of the rapid growth which takes place at puberty. The effect of deficient secretion in youth is seen in *Dystrophia adiposogenitalis*—Frölich's syndrome—characterized by high carbo-hydrate tolerance, increased deposition of fat, dry skin, impaired nutrition of hair and nails, and arrest of sexual development. Hypersecretion produces the well-known picture of acromegaly, with decreased carbo-hydrate tolerance or actual glycosuria. Where it supervenes in youth it causes gigantism. Should subsequent deficiency of secretion occur, we see obesity, somnolence, and increased sugar tolerance, superimposed on the picture of acromegaly. As yet, the treatment of these conditions by extract of the gland has been disappointing. In acromegaly, where there is already hypersecretion, it cannot be expected that any good will result from giving the extract. Here the surgeon has stepped in, and records some brilliant results from partial removal. The operation is a formidable one, and in the absence of eye symptoms and intolerable headache should not be lightly undertaken.

The close interrelationship and interdependence between the secretion of the various ductless glands is suggested by the increase in the size of the pituitary in myxoedema, or after removal of the thyroid, by the simultaneous enlargement of the two glands, and by the enlargement of the pituitary after castration.

The close relationship of both thyroid and pituitary to the pancreas is shown by the decreased carbo-hydrate toleration or even diabetes occurring in connection with exophthalmic goitre and acromegaly. Experimental evidence seems to establish the fact that the thyroid secretion tends to check the activity of the islands of Langerhans, whose hormones govern carbo-hydrate metabolism.

As regards the supra-renals, it is now firmly established that the medulla produces a secretion of extreme activity which stimulates contraction of non-striped muscle through its action on the myoneural junction. As adrenalin, hemisine, or epinephrin, it is extensively used clinically. The cortex of the gland provides a secretion which regulates the deposition and destruction of pigment, and probably also profoundly affects the development of the sexual organs and characteristics. Destruction of the supra-renal induces the clinical picture of Addison's disease, but treatment by glandular extract has proved of little value.

Enough has been said to indicate the advance of knowledge in this direction, to show how complicated is the interrelationship of these secretions, and to confess how little we yet know of their slighter functional disturbances and the method of their control.

Considerable change has taken place in our conception of cardiovascular disease. The importance of raised blood-pressure has been emphasized of late years, and few practitioners are now without some instrument for its record. The tendency still persists with many to consider high pressure a disease in itself to be attacked and reduced in every case, instead of attempting to unravel the cause, and so determine which cases should be treated, which left alone. Instruments for its record are not infrequently employed without recognition of the possible fallacies attending their use.

Turning to the heart itself, we no longer concentrate attention on murmurs and slight degrees of valvular incompetence, recognizing that the condition of the cardiac muscle and the likelihood or not of future degeneration are all-important. The epoch-making work of Mackenzie with the polygraph, of Lewis with the electro-cardiograph, and the pathological studies of Tawara, Keith, and others have revolutionized our knowledge of the physiology of heart-muscle. Most of us are now conversant with that collection of less differentiated muscular tissue, the sino-auricular node, " the pacemaker of the heart," whence normally originate the impulses governing the cardiac rhythm ; with the auriculo-ventricular node, the auriculo-ventricular bundle and its distribution to the ventricles. Many of you are also familiar with the work that has unravelled the various arrhythmias and has established the mode of production and significance of such conditions as pulsus alternans, auricular flutter, auricular fibrillation, and heart-block. Thanks to the electro-cardiograph, we can detect slight grades of hypertrophy of the right or left side of the heart, blocking in various parts of the auriculo-ventricular bundle, the seat of origin of irregular systoles, the presence of flutter or fibrillation.

The study of cardiac disease by the polygraph and electro-cardiograph is a striking instance of the close interrelationship between medicine and physiology. In this case the clinician has been able to repay some of his debt to the physiologist by opening up fresh fields of knowledge. Though much has been done, there is yet much to learn from these instruments, and no well-equipped hospital should be without them. We must beware, however, lest our enthusiasm over details blinds us to the fact that the pumping-station is only one, if the most important, part of the irrigation system, and lest we transfer our attention from one detail to another instead of acquiring a more comprehensive grasp of the circulatory system as a whole. Among other advances secured by these instruments is a completely altered view of the mode of action of cardiac tonics. No longer do digitalis and its congeners figure as a muscle tonic, but as a poison blocking the conduction of impulses from auricle to ventricle, and so allowing the latter to rest and recover its power.

The importance of syphilis as a cause of cardio-vascular disease is becoming more clearly recognized, routine application of the Wassermann test showing that non-traumatic aneurism and aortic regurgitation arising apart from rheumatic fever are as frequently due to this cause as are locomotor ataxy and paralytic dementia, while many cases of unexplained muscle-failure react positively to the same test.

In the realm of neurology greater exactness of diagnosis has followed more accurate knowledge of the functions of the various tracts and centres in the brain and cord, and the co-operation of the neurologist and surgeon has rendered possible operative interference undreamed-of a few years ago. Though deprecating cerebral operations in any but most skilled hands, we should all learn and apply the lesson that early decompression in cerebral tumour not only preserves sight and lengthens life, but also relieves the pain in one of the most terrible and fatal diseases to which man is heir.

As the result of wider knowledge, so-called functional diseases are decreasing in number, and it is no longer permissible to salve our consciences with the diagnosis neurasthenia without further effort to determine the underlying cause, be it toxic or due to overstrain.

For our increased knowledge of the causes of the symptoms of digestive disorders we owe much to the surgeons; much have they done to disentangle for us the symptoms produced by gastric or duodenal ulcer, cholecystitis, and chronic disease of the appendix. For "the inestimable gift of the pathology of the living," to quote the words of that brilliant surgeon and orator Moynihan, we are deeply grateful, as we are for the further restriction of the bounds of that unsatisfactory domain "functional dyspepsia." But are not some of our surgical friends just a little like the intelligent globe-trotter who, coming to a new land, sees quickly aspects of life and civilization which have not struck those living in their midst, and who forthwith, concluding that he knows all, advises remedies for evils of which he but partly grasps the cause? If the physician has in the past been prone to unduly postpone operative interference, are not certain of our surgical brethren a little oversure of their surgical cures? If every case of gall-stones and cholecystitis, however mild, is to be submitted to the knife, we must have assurance that the cause that produced the first attack will not recur. Before we accept the diagnosis of duodenal ulcer from the anamnesis alone we must have proof of the care and impartiality with which the history was elicited, and even then know from experience that the best taken history often leads astray. The diagnosis made, we still recognize that the majority recover without operation. If, while fully alive to the distressing dyspeptic symptoms that may accompany chronic appendiceal trouble, we await further proof that the commonest site of a gastric ulcer is " in the right iliac fossa," might we remind the eager operator that reflex digestive disturbances may have their origin elsewhere than in the appendix or gall-bladder—nay, even above the diaphragm—and that the urgency of symptoms is sometimes dependent on undue irritability of the nervous centre rather than on the magnitude and importance of the stimulus. If we still suspend judgment on the theory that all gastric ulcer is due to obstructive appendicitis, what are we to say of the views of a distinguished surgeon who has recently invaded the realms of medicine, who holds that gastric ulcer, gall-stones, rheumatoid arthritis, tuberculous disease of bones and joints, diseases of the breast, cystic and malignant, of the thyroid, and many other troubles are due to septic absorption from the intestine, and that their salvation is found in joining the ileum to the sigmoid, or in removing the whole colon ?

The limitation of the X-ray picture of the bismuth meal in the diagnosis of gastro-intestinal affections has yet to be fixed, and, as in every new method, conflicting results abound. Already, however, the bismuth meal has afforded useful evidence in both gastric and intestinal disorders, and with the adoption of a standard meal, both as regards quantity and quality, as recommended at the last annual meeting of the British Medical Association, more uniform and useful results will be obtained.

An outstanding feature of modern medicine is greater precision in diagnosis. This has been gained partly by the use of instruments of greater delicacy, partly by the elaboration of biochemical and bacteriological tests. The use of these instruments and the application of such tests demand both time and special training, with the consequent evolution of the specialist. It would be hard to overestimate the gain to diagnostic medicine of the isolation of the organisms in a suspected case of, say, diphtheria, tubercle, or enteric, of the Widal and Wassermann tests, of gastro-analysis, the fluorescent screen, and X-ray picture, the polygraph, electro-cardiograph, and sphygmo-manometer.

Verily we are blessed, compared with our forefathers, in the multiplicity and delicacy of our diagnostic methods. But is their use always altogether free from danger to our patient ? So rapidly do new methods appear that we scarcely master one and recognize its limitations before we throw it aside, lured by the brilliance of a newer and more attractive method. Old well-tried tools are sometimes cast away for others of which we know little, and which must be wielded by specialists in whose ability and accuracy we must blindly trust. While welcoming and appreciating every new method of diagnosis, let us not forget that it has its limitations, and that the more complicated its mode of application, and the greater the number of variables in its technique, the greater the chance of error in the result obtained. Positive results in capable hands are of the greatest value, but do we always recognize the value of the negative ? " Failure to find " is too often unjustifiably construed "absence," and cases could be multiplied showing the danger of relying blindly on laboratory findings.

These newer methods are the happy possession of the dweller in large towns and of those who have access to large hospitals. For the rank and file, for the man in the small town and country, a sound knowledge of older clinical methods is as essential as ever it was.

With the present trend of medical training, do we not run some risk of producing in the future medical scientists in the place of efficiently equipped general practitioners? Let me illustrate my meaning.

Cushing, in his admirable address in surgery at the International Congress, told us, in speaking of syphilis, "To-day the clinical acumen of the practitioner has given way to clinical test by the laboratory expert, and only when the disease is thus proved to exist is a diagnosis accepted. The discovery of the *Spirochaete* and the study of its biological habits have taught us that in certain parts of the body, especially in the central nervous system, the organism is not accessible to former methods of treatment, or, indeed, if reached it may have acquired immunity and resistance to the very drugs supposed to destroy it."

Let us suppose the malady has taken the form of a cerebral gumma. The patient has headache, and there is a suspicious clinical history. What is required? A lumbar puncture, a cystological examination of the fluid, and a Wassermann reaction requiring one specialist; an ophthalmological and perimetric examination requiring another; a neurologist certainly, for a careful study is necessary to determine, if possible, the situation of the lesion; probably, too, a röntgenologist, and perhaps, in the end, another to administer salvarsan; or, in the case of a non-absorbable fibro-syphiloma, as likely as not an operation will be needed; and this for what yesterday was a simple problem easily faced by the practitioner single-handed. That gives you one general practitioner and five specialists, not counting "the probable surgeon," to deal with a condition which is—not "was"—being successfully diagnosed and treated daily by well-equipped general practitioners. Certainly, all these procedures may be needed in exceptional cases, but to make them the rule and require them on every occasion is not only unnecessary but savours of scientific pedantry. Our duty to our patient is to reach a correct diagnosis by the simplest method, and that least disturbing to his peace of mind, body, and pocket. If we can do so as the result of bedside examination, backed by clinical experience, why oust clinical acumen in favour of these numerous special methods, provided always we do not fail to avail ourselves of them in cases of doubt, and bear in mind that a positive laboratory result obtained by efficient workers must weigh heavily in the scale against mere clinical experience?

To the specialist our debt is great and ever growing. Equipped by a sound medical education and a sufficiently wide experience of general medicine, the concentration of his powers on certain regions or phases of disease has added, and is daily adding, untold wealth to our store of knowledge. Every day we are in greater need of his special skill. But is there not some danger of overzeal in this direction, and are we not inclined to force unduly this attractive growth? Are not men tending to specialize too early, before they have acquired a sufficiently wide grasp of general medicine and surgery; and are they not apt, in consequence, to take sometimes an exaggerated and distorted view of the import of symptoms, through too close attention to one narrow field, failing to recognize that symptoms arising in their special area are not infrequently but part of a general disorder, and that no local disease should be studied without reference to its general connections? Do all join the ranks of specialists from a keen desire to push forward the bounds of knowledge in that particular branch, or may it sometimes be the smaller field and larger fee that lures us?

Let me cite a few examples that have recently come under my notice of mistakes due to unbalanced specialism.

A man of middle age, having for years some slight nasal obstruction, develops violent headaches; a rhinologist discovers and removes an enlarged middle turbinal, " the obvious cause "; but the pain remaining unrelieved, a general overhaul is suggested, with the discovery of advanced chronic nephritis.

A woman with commencing cough decides that she has catarrh, and seeks a throat specialist, who, finding a small nasal polypus and some granulations and enlargement of the tonsils, treats her for six months ere she seeks the general physician, to be told that she has advanced tuberculosis.

A clergyman with gouty ancestry develops headaches, and hies him to a gout specialist, who for years treats him unsuccessfully for gouty headaches, which yield at once to correction of astigmatism by appropriate glasses.

A young married woman with a strong tubercular history develops cough and slight fever, with debility. She is long regarded as a case of tuberculosis, till examination of her nose reveals suppurating sinuses, whose treatment results in cure.

Is there not need to pause at times midst our vaunted cures to better study the natural history of untreated disease? We, as a profession, and more particularly perhaps our surgical brethren, are inclined to-day to unduly belittle the *vis medicatrix naturae.* Nature may be a poor surgeon, and may not be as conversant as ourselves with up-to-date medical theory, but she still effects many cures in spite of us.

A doctor's child with non-suppurating tubercular glands in the neck is taken to two eminent surgeons, who say operation is absolutely necessary. Fearing the knife, the parents take him to an expert in vaccines, who assures a cure by small doses of tuberculin, guided by study of the opsonic index. To be quite certain, they consult another vaccinator, who also promises cure, but the dose must be large. Bewildered by such conflicting advice, they delay, and the child gets well ere they can decide on the right treatment.

Doubtless each of these specialists was right in promising cure, but each and all neglected the fact that under suitable hygienic conditions the majority of such cases are able to effect their own recovery.

Do not misunderstand me in this matter: specialism has done, and is doing, magnificent work for the public and the profession alike. To it we owe much of our advance in knowledge of disease. But there is a real and growing danger of it restricting itself to a too narrow field, and, by ultra-concentration, failing to compass the true solution of the problems set before it.

This difficulty of preserving a broader view besets us all, general practitioner and specialist alike. Insensibly we drift into certain channels and float contentedly on, raising our heads at lengthening intervals to view the fields around, satisfied that the glimpses we get between the tangle of custom on the banks is all there is to know, or giving unduly credulous ear to the tales of those who have ventured to penetrate at certain spots the overhanging brushwood. Hence comes our readiness to adopt every new mode of treatment and blindly follow every fashion of the day. True, we have abandoned our faith in polypharmacy, and in all but a few well-tried drugs. In their place the bacteriologist dangles before us serums and vaccines which in and out of season we inject into a gaping public *avidus rerum novarum*.

In the matter of vaccines it is difficult to attain a satisfactory viewpoint ; impossible to arrive at a final general conclusion. In a limited class of case their efficacy seems to be definitely established, and prospectively their usefulness may be extended by further study. Nothing is easier to a bacteriologist than the isolation of some microbe from a specimen and the preparation of a so-called vaccine therefrom ; but the applicability of the vaccine is not merely a matter of the aseptic injection of a sterilized culture ; its proper use demands more consideration for the recipient as a patient than is commonly bestowed in such cases. I do not suggest that there are not conscientious men endeavouring to understand this question and to do what is right, and wish with all my heart that they may succeed in reaping the fulfilment of the theoretical promise of vaccines. But, practically, we have no great body of data about them, so in the meantime it is meet to call a halt in the indiscriminate injection of vaccines made from organisms whose connection with the lesion treated is often more than problematical, and to remember that the enthusiasm of the immunizer is not infrequently in proportion to his ignorance of the natural course and trend of the malady he treats.

To quote the words of Theobald Smith, " Let the medical profession see to it that vaccine therapy does not degenerate into inconsiderate and reckless experiments on human beings, that it does not create false hopes in hosts of patients, and that it does not originate and end in commercialism and the desire to exploit the weak and unfortunate." These are plain words, but in my judgment none too strong. It is greatly to be feared that opportunity combined with professional ignorance are like to prove too much for human virtue.

In this exploitation of the public the public Press bears no mean share. Ever in search of novel and sensational news, it gives ready ear to the unscrupulous self-advertiser, or, more dangerous still, the blind but honest enthusiast. Without waiting to verify its facts, and reckless of the harm it may do, it heralds some new discovery or cure. Forthwith an eager public rush to the specialist who employs the particular cure, or demand it from their regular attendant. Under such circumstances it takes a strong will and a high sense of duty to tread the narrow path when the Press and public acclaim our weaker brother as he glides comfortably along the broad and gilded way to affluence.

The mass of modern medical literature and facility for publication, while of value, have their drawbacks. We tend to rely on what we read rather than on our own observation ; we swallow some one's brilliant results without knowing the personal factor of the writer, of his capacity for careful critical observation, of his knowledge of the course of disease, of his freedom from self-hypnotism. Innumerable workers, many inadequately trained, with little clinical or pathological experience, befog us who have not the time to follow sufficiently closely the growth of the particular branch with which they deal to enable us to distinguish the base from the true metal.

It is by congresses such as this that we clear our mental horizon, appraise the personal factor, and from comparison of varied experiences obtain a more correct perspective in our work.

With the rapid growth of medicine it is increasingly difficult to find time in the curriculum of the student to combine adequate scientific studies and efficient practical training in general and special subjects. The tendency seems to be to cut away some of the groundwork to leave more room for the ornamental superstructure, but at no time more than the present has there been more need for sound scientific training and culture of the faculty of critical observation, combined with adequate general clinical experience on the part of our students, if we are to save the practitioners of the future from becoming the credulous tools of the unbalanced enthusiast or of the specious vendor of pseudo-scientific proprietary nostrums.

Wherein lies the remedy to these dangers which beset the efficiency of our profession ? In a body of soundly equipped general practitioners who though not themselves specialists are yet able to weigh the advice of the latter and to view it from a broader standpoint. In a wider and more thorough knowledge of the natural history and trend of untreated disease. In insisting on our specialists being in the first place sound all-round practitioners. In a closer correlation between general practitioner and specialist. In insisting that every patient shall reach the specialist only through the medium of and after careful examination by a competent and conscientious general practitioner. In the recognition by the general practitioner of his limitations, and in his readiness to avail himself of the aid and co-operation of the specialist. In frequent opportunities of exchanging ideas and correcting impressions, such as are gained by attendance at medical discussions and congresses. In one and all ever keeping before our eyes the fact that the welfare of our patient is, and must always be, the supreme and only object of our endeavours, remembrance and practice of which precept has set medicine apart as the most noble among the professions, neglect of which debases it to the level of a sorry trade, battening on the misfortunes of our fellows.

And now I have taxed your patience long enough. If I have lapsed from a tale of heroes into a too close scrutiny of the weak spots in our armour, believe me, it is in no carping spirit, but from an earnest desire for the welfare and efficiency of our profession, and that we may more truly merit the eulogium of Elisha Bartlett, who says of us, " In the circle of human duties I do not know of any, short of heroic and perilous daring, or religious martyrdom and self-sacrifice, higher and nobler than those of the physician. His daily round of labour is crowded with beneficence, and his nightly sleep is broken, that others may have better rest. His whole life is a blessed ministry of consolation and hope."

DEPARTMENT OF PUBLIC HEALTH, NEW SOUTH WALES.

By the Hon. W. A. HOLMAN, Premier of New South Wales.

IN laying before this Congress a brief account of the actions and proposals of the New South Wales Government in connection with public health, my desire is to bring certain purely administrative aspects of the problem before a body of experts naturally concerned primarily with its technical side.

Administrative difficulties need, I am sure, make no apology for their appearance in the distinguished company of purely medical problems. And it is to be noted that in new and expanding countries they are of two kinds. Governments are confronted not merely with the necessity of obtaining high standards of technical excellence, but also with that of conveying some measure of health-management to remote and thinly populated regions.

This is a consideration with which in young countries all departments of Government are familiar. In education or in the administration of justice, as in matters of health, there is a double danger—first, that in the centres the machinery erected may not be so good as it ought to be ; and, second, that in the outskirts there may be no machinery at all.

The purely technical mind is apt, I may submit, to concern itself too largely with mere perfection of process ; the purely administrative mind with the extent of area covered. I believe it will appear that in New South Wales we have recognized the necessity of securing both as far as possible.

Maternity.

1. Beginning at the beginning, we are devoting special consideration to the question of maternity and the protection of child-life, regarding a healthy child as the most valuable asset in a young community. Special women's hospitals exist, and their functions have been recently specially enlarged. We propose to build others to meet the growing feeling that confinements should as far as possible occur where the most modern scientific facilities for obstetric treatment are available. In our congested centres we seek to encourage the confinement of women in hospitals specially adapted for the purpose, rather than in their own homes, which are only too often most unsuitable.

In the country we purpose insisting upon every new hospital making provision for a maternity annexe, containing a sufficient number of beds to meet the circumstances of its district. We have already commenced this policy in connection with recently erected country hospitals.

Where it is not possible, for reasons of distance or any other cause, for a patient to come to the hospital, provision will be made for a doctor and nurse to go to her. Every part of the country, by arrangement of the districts, can be provided with the necessary medical staff. Financial aid is now given by the Federal Government in the shape of a maternity bonus in all cases of confinement. It is the aim of the State Government to provide the medical aid and nursing assistance without charge to those unable to meet it.

2. Children having been safely brought into the world, we next make special provision for the dangerous years of infancy.

(*a.*) A Babies' Hospital has been recently brought into existence in Sydney for the specific purpose of combating one of the most dreaded diseases of children (gastro-enteritis), and is appropriately named, after the esteemed wife of our Governor, the "Lady Edeline."

(*b.*) We are now building special hospitals for children in large country centres, the justification for this step being the high mortality of child-life in some of the remote centres of our State.

(*c.*) We subsidize establishments specially providing for the teaching of women in regard to maternity matters and the care of their children. These are the women's hospitals already mentioned and the Lady Edeline Babies' Hospital. As the system of bush maternity nursing—indoor and outdoor—grows up, similar duties will be undertaken by the staffs employed in it. This is an entirely new development, and justly regarded as of the first importance.

Medical Inspection of School-children.

3. As a third step, our care pursues the child through his school life.

At the end of 1912 (the last statistics available) there were, roughly, 230,000 children attending the State schools, about 45,000 attending Roman Catholic schools, and about 15,000 attending the other schools in the State, a total of 290,000.

(*a.*) All children attending the State schools and the Roman Catholic schools and a proportion of those attending all other schools (private and denominational) are medically inspected by officers of the Department. All the private and denominational schools were offered inspection; a few have declined, and some have apparently not yet made up their minds. The immensity of this work cannot be measured by the number of children to be inspected, but by the distances which have to be travelled to get to the children. In a few cases the medical officer has to travel as much as a hundred miles from one school to another without railway facilities. The inspection is fairly thorough, dealing with most of the systems of the body. The child is told nothing. The parent is notified of any defects found, and at the same time is given a printed sheet instructing him or her of the nature of the condition, the danger of allowing it to go untreated, and how to go about getting it treated.

(*b.*) Six to eight weeks after inspection inquiries are made with the object of finding out the children who have not been treated. These cases are followed up thus: In the Metropolitan area and the larger country towns a school nurse visits the parents and talks to the mother with the object of inducing her to get the child treated. In other parts, two, three, or more urgent notices are sent out to the parents to try and get them to have the children treated. In the back-country districts, where ophthalmia is prevalent, the school medical officer gives first medical treatment to children suffering from this condition, and instructs the child or parent (or both) how to carry on the treatment. Then the Department supplies free, through the teacher, a pamphlet describing the condition and how to carry on the treatment, as well as the necessary drugs for doing so. It is hoped by this means to reduce very considerably this scourge of the back country, which, of course, is contagious.

(*c.*) These steps have been found inadequate in many cases. It is accordingly proposed to start almost immediately what may be called a travelling hospital (a travelling clinic). This will be staffed by two medical officers, a dentist, and a nurse. One medical officer will deal mainly with eye troubles—examining the eyes with a view to prescribing glasses; and will in appropriate cases give anaesthetics for the second medical officer to perform minor operations, such as the removal of adenoids, large tonsils, &c. The dentist, of course, will deal with the teeth. The necessity for this hospital is apparent, because in the country few medical men test the eyes for glasses, and there are few dentists available. Parents have to pay now, to get glasses for their children, anything up to £2 10s., and even then the testing of the eyes and the providing of the glasses are done by opticians, which, of course, is not satisfactory.

By these measures it is hoped to secure for the coming generation a good start in health, and ensure their commencing adult life on a sound physical basis.

Institutions for Insane and Infirm.

4. We have in New South Wales no such institution as a lunatic asylum; further, we have no benevolent asylums as understood; we have no such thing as "the workhouse." What we have got are hospitals for the mentally afflicted and hospitals for the infirm and aged.

(*a.*) In our hospitals for the infirm, as in our hospitals for insane, the State provides an efficient medical staff, with the complete appurtenances of a general hospital. These institutions are performing a splendid work based upon sound ideals. Every person admitted is treated as a patient under a doctor's care.

(*b.*) The disturbing increase in insanity statistics creates a pressing Governmental obligation. Every person under restraint is a direct expense to the Government, and so a national loss. But the injury to national efficiency involved in the economic incapacitation of the thousands affected is a far more serious consideration. My colleagues and I are strongly impressed with the necessity for preventive treatment in mental cases. At present little is done to meet mental trouble in its incipiency. Our Inspector-General of the Insane has recently established a small hospital with twenty beds, in connection with the reception-house, for the treatment of the cases of incipient insanity, at which many good results are obtained. Otherwise there is, as far as my knowledge extends, no treatment provided in our State. The help of this hospital is not invoked in most instances until recovery is impossible. The remedy for mental disorder in the vast majority of cases is, we are informed, to be found only in early treatment. We learn that a similar plan has been adopted in Germany, where several small hospitals with about a hundred beds have been established for the early treatment of mental disorders; and in certain Scottish and American hospitals special wards have been provided for the accommodation of "nerve" cases applying at the hospital and unsuitable for admission into the medical wards.

(*c.*) It is also recognized as necessary to make special provision for the "neuropath." Under this heading comes a large and important class of patients, many of whom are possessed of full intelligence and capacity, but break down temporarily through overstrain. It is our intention to provide on modern lines for this class of case. To dissociate it as far as possible from connection with institutions for the actually insane, it will probably be found necessary to have a separate hospital specially fitted for the work and altogether independent of the Lunacy Department. Certainly, it must be so planned as to allow a proper classification of the different types of patients and of a wide variety of systems of treatment being administered — for example, massage, electricity, rest cure, and so on. Its operation could be enlarged to include the patient of this class who under existing conditions applies at the outdoor department of a general hospital, and who is sent away with a prescription either because he is looked upon as troublesome but unimportant, or—more often still—because the nature of his case does not admit of successful treatment in a ward of a general hospital.

Although no final opinion has yet been reached, my colleagues are alive to this important but neglected phase of the health problem, and prepared to act in the immediate future.

After-care Association.

(*d.*) My reference to mental disorder must include some mention of the "After-care Association." This is an admirable organization which safeguards the interests of patients discharged from a hospital for insane. For a sufficiently lengthy period after discharge the members of this association watch over his or her interests; they find employment, and in many other ways assist in preserving his well-being. The excellent work of this organization is encouraged in every way by the Government, who substantially subsidize its funds.

Preventable Diseases.

5. The prevention of preventable diseases and the cure of curable diseases among the masses of the people—the working classes and the middle classes—who can ill afford to employ the best medical and surgical skill, should be recognized, it would be imagined, as an imperative duty of Government. This, however, has not been the case. For twenty years successive New South Wales Governments have been urged by the medical profession to systematically attack consumption. The present Government, profiting by such warnings, has seen its way to commence a national duty too long neglected.

(*a.*) As a first step, it gave a subsidy to the National Association for the Prevention of Consumption, with which the name of Sir Philip Sydney Jones is honourably associated, and enabled it to start the first anti-tuberculosis dispensary in Sydney. This dispensary has more than justified its existence. Numerous consumptive cases have come to it and had the benefit of modern methods of treatment.

(*b.*) At the same time, an honorary Board of medical and other experts was appointed to advise upon further measures. They have recommended compulsory notification of phthisis, with appropriate safeguards, throughout the State (it is now compulsory only in the metropolis); the provision of sanatoriums for early and advanced cases; and the creation of a fund from which to help families of small means, whose breadwinners are compelled to undergo treatment in sanatoriums. These are matters requiring parliamentary action, and opportunities have not yet offered of securing the necessary legislation.

(*c.*) But an extension of the dispensary system, which has been tried and proved, required no legislation, and has been pushed on vigorously. Additional dispensaries have been provided at Prince Alfred Hospital and the Merrickville Hospital, and further institutions are now in contemplation, notably one in a populous part of the metropolis and another at Newcastle. A chain of dispensaries will ultimately be run right round the State, every important centre of population being provided for.

(*d.*) The methods of operation in fighting consumption are, primarily, providing nurses to visit the home and advise the patient, and, secondarily, classification of cases into—(1) Those who can be treated in their own homes; (2) those cases in which the disease has so far progressed as to demand sanatorium treatment; and (3) hopeless cases, in which provision must be made for the patient's maintenance until death under conditions primarily directed to the preservation of the health of the rest of the community.

(*e.*) Provision will be made, in those cases where the patient is able to work, for the State to provide the means for earning at least some portion of his or her livelihood—for instance, for males with whom the disease has not advanced too far we propose tree-planting. In cases where appropriate employment cannot be found the State must face the responsibility of the patient's upkeep, either wholly or in part.

(*f.*) Measures are now in preparation to make consumption a notifiable disease under safeguard, and new precautions are being adopted in connection with the supply of meat and milk.

Venereal Diseases.

6. With regard to venereal diseases, what we have done is to appoint a committee of experienced medical men, who are now investigating with a view to furnishing a report to the Government as to the best means of dealing with venereal diseases in their various forms.

Fever Hospitals.

7. My Government also have in contemplation a special fever hospital to which would be sent all typhoid, scarlatina, and other infectious or contagious fever patients, with full provision for patients able to pay for special accommodation.

The treatment of fever cases at general hospitals would be limited to a small number of beds—say, two or three in each hospital. Such provision, it is obvious, is indispensable for the treatment of critical cases. Beyond these, however, as already indicated, the services of the fever hospital would be available to cope with everything in that class. There is no provision at present for paying patients suffering from infectious disease.

Research Work.

8. It is our desire that New South Wales should take its place and responsibility in the matter of research work in the interests of medical science. We believe that in New South Wales we are well situated climatically and geographically to take our share in the work of the civilized world in this all-important direction. I can conceive of no

greater work than that of contributing in some way to the new knowledge which adds to the world's means of combating disease and relieving human suffering.

My Government contributed liberally to the search for the South Pole and in prosecution of scientific investigations in that region. In the near future we are to have the honour of entertaining the British Association. Apart from these small matters, comparatively little Government action has so far been devoted to the promotion of scientific inquiry. But how much more noble is it to increase, as the result of investigatory work, the information of medical men in the treatment of the sick and to assist the people generally with the knowledge of how best to protect themselves against sickness and disease.

Scholarships to assist in Research Work.

In older countries many examples are before us of scholarships in the interests of medical research which are tenable at universities.

Nothing tangible has been so far done by our Government either by grant or subsidy towards establishing travelling or other form of research scholarships as an agency for the uplifting of the standard of local knowledge. Other branches of science—for example, engineering—have been placed on a more favoured basis in this respect by the action of private benefactors. In Australia, however, private benefaction has very definite limits, and apparently the establishment of travelling or other form of scholarships can only be rendered possible by Government aid. My colleagues and I will accordingly accept the principle that the State in these enlightened and progressive days must accept its responsibility and provide the necessary financial and moral support. We have already endorsed a like principle in art and in branches of science other than medicine. The development now contemplated is a novel one, but I feel confident that we shall have for it the warmest endorsement of the community.

General Hospitals.

9. (*a.*) The broad question of hospital nationalization is rather one of finance than of administration. My Government is committed to it as a matter of policy, and our policy is, as a matter of fact, automatically effectuating itself. Every year the proportion of hospital expenditure met from purely Governmental sources steadily increases. The accounts of the Sydney Hospital for last year, I am informed, show that patients contributed £11,000 to its upkeep, and the general public £4,000 in the shape of subscriptions, while the Treasury gave twice the total of both these sums, or £30,000. It is apparent that, when this state of things obtains, the day of general nationalization cannot be far off.

(*b.*) The rise in the cost of living has made its objectionable presence felt in hospital administration. The Sydney Hospital, for example, costs £105 per bed per annum, largely owing to the fact that the most highly skilled and elaborate attention is available there. In addition, the institution is located in the midst of a big centre of population, where land is of a high value, &c. The increasing cost per bed of our large general hospitals has made it an imperative necessity for those beds to be used by as many patients during the year as possible, and the policy seems to have been frequently adopted of discharging patients as soon as they are out of immediate danger. There must be provided convalescent institutions containing sufficient accommodation to meet all such cases. In such institutions the cost would be considerably less—perhaps only half the bed-cost in the big general hospitals. Further than that, it is in the interests of the patients' quick recovery to be removed from actual hospital surroundings.

At the present time there are no such Government institutions in my State, but there are two privately owned and admirable convalescent homes—the Walker Hospital, on the Parramatta River; and the institution at Camden. The accommodation available, however, is lamentably insufficient.

Government Control.

10. Hitherto in New South Wales the effectiveness of Government control of health administration has been discounted by its status as a mere sub-department. The large volume of important administrative reform which I have glanced at and the mass of administrative detail arising out of their future operations justify us, we believe, in giving to this vital subject a greater and justifiable prominence. It is in contemplation to secure these far-reaching reforms by creating a special portfolio of Health in the Government, and thereby placing this paramount public interest on a sound footing. In the establishment of a Ministry of Public Health we shall, we believe, provide a guarantee that the largest State of Australia shall secure the physical well-being of its citizens and the highest point of civic efficiency.

DISCUSSION.

The PRESIDENT proposed that a hearty vote of thanks be given to Mr. Holman for his interesting address. While he had been listening to the address the old proverb to the effect that constant dropping would wear away great stones had occurred to his mind. The Australasian Medical Congress, from its inception, had been hammering away in the effort to get just such reforms as had been outlined in the address, and it had been a surprise and a pleasure to him to hear from Mr. Holman what had already been done in New South Wales, and what it was still proposed to do. It made one feel that some social good was being done by their Congresses. What appealed to him most was the proposal to establish research laboratories and endow scholarships. He trusted that the Government of New Zealand would do something on similar lines. As one interested in ophthalmic practice he was glad to hear that it was the opinion of the New South Wales Government that the measurement of the sight by spectacle-makers was unsatisfactory, and it was to be hoped that steps would be taken to have such work confined to properly trained men.

Dr. WORRALL (Sydney) thought that every member of the Congress present must feel grateful to Mr. Holman for breaking into his holiday in order to attend the Congress, though it did not follow that Congress as a body endorsed every proposal he had put before it.

Dr. LOCKHART GIBSON (Brisbane) asked whether it was intended that admission to the hospitals, when they were nationalized, should be confined to necessitous persons.

The Hon. Mr. HOLMAN: No; that is not involved in the idea of the national control of hospitals, as Dr. Gibson will see from what I have said about the fever hospital. That will be purely a State institution, but it will be open to those who are able to pay.

Dr. LOCKHART GIBSON agreed that the position of hospitals for infectious diseases was different from that of general hospitals. People might take advantage of infectious-disease hospitals for the sake of the protection of their neighbours. A rich man who contracted an infectious disease might be only too glad to enter an infectious-disease hospital supported by the Government, and the Government would be quite right in admitting such a case. It was, however, a different matter when a general hospital supported by the State opened its doors to other than the necessitous. He was sure it was the opinion of the profession generally that public hospitals were best conducted by means of the honorary-medical-staff system. Not only was it better for the patients, but it was also better for the profession that honorary medical staffs should exist. Nothing was more calculated to maintain a high standard of honour in the profession than the fact that its ablest men placed their services gratuitously at the disposal of the necessitous in the public hospitals. He did not think the Government of New South Wales, or any other Government, would find the profession opposed to the nationalizing of hospitals so long as they insisted upon admittance being confined to the necessitous. The question of intermediate hospitals, for those not poor enough to be admitted to the general hospitals and yet not wealthy enough to obtain the best advice, was one which the profession was endeavouring to face, and had faced to a certain extent in Victoria, but certainly a public general hospital should be limited to necessitous persons.

Dr. SPRINGTHORPE (Melbourne) was extremely glad to hear from Mr. Holman that his Government were taking steps to remedy the greatest of the defects in connection with the Federal maternity bonus —the want of some provision to ensure that it was applied to the purpose for which it was intended. But why, he asked, should free treatment be provided by the State Government to people who were receiving this bonus? Mr. Fisher had stated over and over again that this bonus was for a specific purpose. Why should not the £5 bonus be given to the State Government in return for the service which its staff would give under the scheme Mr. Holman had outlined?

Dr. JAMIESON (Sydney) said that during the address he had remarked to Dr. Springthorpe, "That is what we are doing in New South Wales," to which Dr. Springthorpe had replied, "Could not you lend Mr. Holman to Victoria for a while? That is what we want." He thought every one present would agree with that remark. Mr. Holman and his Government had done more for the medical profession in New South Wales than any Government which had preceded them. Personally he (Dr. Jamieson) had never voted for the Labour Government, and he would never do so until they abolished the caucus and preference to unionists, so that he was not making political capital in saying what he had said in its praise.

Vote of thanks carried by acclamation.

The Hon. Mr. HOLMAN, in acknowledging the vote, said he had felt it to be a very great honour to be allowed to read a paper before this distinguished gathering, and he was gratified to find that the facts he had set forth in that paper were felt by the members of the Congress to be of some value. With regard to Dr. Jamieson's observation as to preference to unionists, he could only say that during struggles with the British Medical Association he had felt the same objection himself. The questions as to the details of the nationalization of hospitals caught him unprepared. In politics it was a good principle not to try to shake hands with the devil until one met him, especially the financial devil. The difficulty with nationalization was that it involved heavier calls upon the State finances than the Government were prepared to meet at present, and the matter stood over for a year or two. The matters set forth in his paper were those which were either being done or immediately practicable, and within eighteen months they would all be started. Though the Government were committed to ultimate nationalization of hospitals it must stand over for the present. When it came forward to be dealt with he would be glad to have advice and assistance from the medical profession, such as it had given on other questions relating to the public health, and that advice would be esteemed by the Government and accepted by them in the same spirit as in the past.

BRITISH NATIONAL INSURANCE ACT.

By Dr. J. A. MacDonald,

Chairman of the Central Council of the British Medical Association.

Dr. Parkes, President of the New Zealand Branch of the Association, took the chair, and, in introducing the speaker, said,—As President of the New Zealand Branch of the British Medical Association, I have much pleasure in introducing Dr. MacDonald, who is Chairman of the Central Council of the Association, and has kindly consented to address the meeting on the question of national insurance and its operation in Great Britain. That is a question upon which we in New Zealand have been very much in the dark. Our knowledge concerning it has been practically limited to the reports we have seen from time to time in the *British Medical Journal*. The question is one that will probably have to be faced very soon in this country, and I think we are very fortunate in having the opportunity of obtaining information first hand as to the working of the system in the Old Country, from Dr. MacDonald, who will be able to give us valuable information for our guidance in the future. I have much pleasure in calling upon Dr. MacDonald to address the meeting.

Dr. MacDonald.—Mr. President, ladies, and gentlemen, I must, first of all, as Chairman of the Council of the British Medical Association, express my thanks to the profession for the very cordial reception that has been extended to me. Besides thanking you officially, I wish to express personally my warm gratification for the heartiness which has been shown to me in Australia and New Zealand by every member of the profession with whom I have come in contact. It is very pleasant indeed, at such a distance from home, to be so heartily received by one's professional brethren.

I must say that I received a shock last night when I discovered that what I am going to say about national insurance has been dignified with the title of an address. My own idea when I undertook to speak was that I could be of most assistance to the profession in this part of the world by giving what might be called a friendly chat on the subject, rather than a formal address, and then by answering any questions that might be raised by those present.

As you are aware, some years ago a National Insurance Bill was introduced into the House of Commons by the present Chancellor of the Exchequer, Mr. Lloyd George. The question whether such an Act was needed in England or not was a very debatable one. The conditions in Australasia, as far as I have seen, are entirely different from those of the Old Country, and the question whether a national insurance system is needed here is still more doubtful than it was in England; in fact, if I were to judge from my short acquaintance with the condition of affairs here, my opinion would be that national insurance is not necessary in any of these dominions.

The Act in Great Britain is compulsory upon the working classes—upon all manual workers—and persons with incomes of less than £160 a year may become insured as voluntary contributors. It is a contributory Act: every working-man has to contribute a certain amount under it. The money is deducted from the worker's wages—4d. a week in the case of a man and 3d. a week in the case of a woman. The employer contributes 3d. a week in each case, and the Government contributes 2d. Here you see the origin of the famous phrase that Mr. Lloyd George said he was "giving 9d. for 4d."

The fact of the system being contributory makes the working-men very keen in seeing that the work under the Act is carried out. The fact of it being compulsory has been the cause of a great amount of dissatisfaction amongst the working-people, particularly the agricultural labourers and the domestic servants, the two classes who are worst treated under the Act. Before the National Insurance Act was introduced domestic servants were generally—but not universally—looked after by their masters and mistresses, in that medical attendance was usually provided for them. Under the Act the servants have to select a medical man who is on the panel, who may or may not be the medical man in attendance upon the household. When ill the servants receive 7s. 6d. a week as sickness benefit, and they are now expected to go out of the employer's house when ill and provide themselves with living and lodgings out of the 7s. 6d. a week, so that the conditions are not as good for the servants as they were under the former system. That naturally is a cause of great annoyance to the servants. There is the additional disadvantage that servants are constantly travelling about from one district to another as their engagements expire, and they take on new engagements, and there is consequently difficulty in connection with the financial arrangements. The agricultural labourer, in particular, is badly treated. The incidence of sickness with this class is notoriously very small—much less than is the case with the miner and the artisan. Yet the agricultural labourer has to pay at the same rate as the miner and the artisan, who are earning from two to five times as much per week as he is. That has been a great cause of dissatisfaction with the working of the Act in England. The people who benefit under the Act are the manual workers, whatever their wages may be.

The admission to the benefits of the Act of voluntary contributors with incomes up to £160 a year was a point upon which the medical profession at once came to loggerheads with the promoters of the Bill.

One of the fundamental difficulties we had had in dealing with the friendly societies before the Act was brought into operation was the fact that they would never allow the question of a wage-limit to be mentioned. The same difficulty presented itself when we came to deal with the Act.

The benefits obtained under the Act are, first, the medical benefit—that is, the attendance of a medical man—and then the sickness benefit. The insured man gets 10s. a week during a period of sickness for twenty-six weeks, and 5s. per week for another twenty-six weeks. A woman gets only 7s. 6d. per week—she pays a smaller contribution. Then there is what is called the maternity benefit. You have something similar here, only it is more extensive—I understand, £5 or £6. In England the wife of a worker, or a woman worker, gets £1 10s. for the time of lying in bed during confinement, or the time she is out of work. But if besides being the wife of a worker she is also a worker herself she gets £1 10s. for her own benefit, £1 10s. because her husband is an insured person, and 7s. 6d. a week sickness benefit for four weeks. The result is that she gets £4 10s. where an ordinary working-woman gets only £1 10s. That is one of the anomalies that have caused dissatisfaction. Then there is an unemployment benefit provided for in the Act, but only for certain classes of employment. An additional amount has to be paid to obtain it. Again, there is what is called the tuberculosis or the sanatorium benefit. The benefits under the Act are given only to the working-persons themselves, not to their families—the families are not insured at all. The only person insured is the worker. It is quite different, I understand, in your friendly societies—in that case the members of the family are included in the engagement. But, as I have said, in England it is only the working man or woman that is insured. But one peculiarity of the sanatorium benefit is that it includes the dependants as well.

The Bill was introduced by Mr. Lloyd George in a way which we considered scandalous. It was introduced after two years' discussion with the friendly societies and consideration of the German system. Originally it was drafted on friendly-society lines, and that was what we, as medical men, considered was the fundamental error. The friendly societies in England in those days were not as they are here with you. In England a doctor was attached to a particular club, and any man who belonged to a club had to have that doctor as his medical attendant, unless he preferred to pay privately to another doctor. The medical man might be carpeted before the committee of the club in case of complaint, and in case the decision went against him he had no appeal except to the members of the club. The amount that was paid to the doctors in those days was, on the average, 4s. per head per year, and the service was to include the supply of drugs and appliances. Some of those present are laughing at that, but in comparing it with your own system of friendly-society work you have to remember that it was only for one person—it did not include the members of the family. You might have in a household, and belonging to the same club, the father and two sons, who would be paying between them 12s. a year, and we had nothing to do with the wives and families. I have been astounded, on going into your own system, to find that it is not much better, if at all, than ours was in connection with the old friendly societies.

Some years ago this question of contract practice in England was discussed by the British Medical Association very fully, because we considered it was time that we got better terms than we had from the friendly societies. We then drafted a report, which has been used as a sword against ourselves by Mr. Lloyd George, and has smitten us very hard. That report was a very faulty one. When we came to go into the matter afterwards we agreed that the conclusions to which we came at that time were not warranted by the evidence. However, as I have shown, the fundamental error made by Mr. Lloyd George prior to the introduction of the Bill was that he made no attempt to consult the medical men with regard to its drafting. We considered that that was a very grave error in tactics.

On our part we attempted to get into communication with the Government in regard to the Bill. We sent deputations to interview the Chancellor of the Exchequer, and tried to get copies of the proposed Bill, but were unable to do so. Every one in the profession was interested in what the Bill was likely to be, and we formed ourselves into a stronger association than we had been in the past. After great efforts we obtained a copy of the Bill from Mr. Lloyd George. We went through the terms of the Bill, and found that they were utterly unsuitable—" derogatory to the profession," as we put it. We decided to try to get the terms laid down in the Bill improved.

Many medical men absolutely refused to have anything to do with the Bill, and tried to wreck it. The general body of the Association decided that that was not good policy. The Bill was there, and many of the people of the country considered that it was a beneficent measure as far as the working classes were concerned. The bulk of the Medical Association came to the conclusion that our policy should not be to wreck the Bill but to try to amend it as far as we could. With this object they made effort after effort to get from Mr. Lloyd George a statement as to what he wanted the medical profession to do. We drafted our own policy—what came to be known as " the six cardinal points." Again and again we attempted to get Mr. Lloyd George to define what he meant by medical benefits. In our policy we meant that our service should be somewhat on the same lines as in the case of the friendly societies.

At last Mr. Lloyd George gave us his decision as to what he expected from us, and it was a somewhat curious one. The decision he gave was that the medical benefit that was to be expected by an insured person was the treatment that might be expected from any medical man of average skill and ability. Just think of that for a minute. I dare say most of the men in this room regard themselves as practitioners of average skill and ability. Is there anything in the range of ordinary practice that you are not prepared to do? As you will see, the result was that Mr. Lloyd George asked the profession practically to do everything that could be done by a medical man on the terms he laid down. He said that they were very generous terms. What he offered was 6s. per head of the insured persons, and that was to include provision of drugs and appliances. He estimated the cost of drugs and appliances at 1s. 6d., so that the medical man was to receive 4s. 6d. per head for his services.

We did not agree with Mr. Lloyd George that his terms were generous. When we drafted our " cardinal points " we demanded 8s. 6d. per head, inclusive of drugs and appliances. We also demanded that every insured person should have the free choice of doctor, and that the doctor should also have the right to refuse any patient that came to him. Our third point was that the administration of the medical benefits should be transferred from the friendly societies to the Insurance Committees.

The Act is primarily administered by a Commission, which sits in London, and is supposed to control other Commissions for England, Wales, Scotland, and Ireland, but does not. These Commissioners have under them what are called Insurance Committees. Every county in the kingdom and every county borough has its own Insurance Committee. These Committees are really autonomous, but there is an appeal from their decisions to the Commissioners. A certain amount of money is allocated to each insurance area, and the Committee can only draw on the fund allotted to its particular area. This acts unjustly in many ways, which are too intricate to explain just now.

Another of our points was that there should be adequate medical representation on all the administrative bodies. We did get representation of a sort. Our experience on this point was one which shows the difficulty medical men meet with when they come to deal with politicians. We were allowed a certain number of medical men on the Insurance Committees. We did not think it was sufficient, and appealed for a larger representation. Mr. Lloyd George graciously granted us more representation, but promptly introduced into the constitution of the Committees a provision that the insured persons should have a majority of representatives on each Committee. The result was that our representation became a farce, and went by the board.

Another condition that we asked for was that the ultimate Court of Appeal on all matters dealing with medical questions should consist of medical men. We considered that no other body was competent to decide such questions. In other words, we wanted to be dealt with by our peers. But when we presented these terms to Mr. Lloyd George he laughed at the idea. Again and again we tried to meet him and discuss the matter, but we could not get on terms with him.

Ultimately we held our famous meeting at which we declared that we would not undertake the duties which the Act required of us until the terms we asked for were granted. To ensure that we should be able to carry out this idea we started a campaign throughout the country. We got the great majority of the medical men of the country agreed to sign an undertaking that they would not take service under the Act until the terms agreed upon were such as the British Medical Association would approve, and that they would resign from the clubs as soon as they were asked by the Association to do so.

When we came to the decision that we would refuse to take service under the Act, and we could get no agreement from the Government to alter the terms of service, we called upon the medical men to resign from the clubs, and also communicated with the Government our determination not to take service under the Act as it stood. We also established a guarantee fund to recoup medical men who might incur losses through acting in accordance with our desires. That proved to be one of our failures. It was badly managed to begin with, and I would advise this Branch, if ever it decides to form such a fund, to take care to get in the money and not be content with guarantees.

As soon as our ultimatum was put before the Government there was started in England a Press campaign, fostered by the Government, which was really lamentable. It was stated boldly that the Government had enough medical men at their command to man the whole of the proposed service. Now, remember, there were about fourteen million insured persons to deal with, and our calculation was that it would take from ten to twelve thousand medical men, devoting their whole time to it, to work the Act. As a matter of fact, at the time the statement was made that they had sufficient men available to work the Act they had not more than two thousand at their command. However, this statement was made broadcast throughout the country. It was made by Cabinet Ministers, and was also fostered by some of our own leading men. The result was that the doctors began to break away—they became afraid. I think in that they made a great error, but I do not find serious fault with them. They had their wives and families to consider. We were an untried body who had never entered into a contest of the kind before. We did not know how far we could trust each other. We were up against the most powerful body in the world—the British Government. Here were a number of men through the country whose incomes depended upon this class of work, and we must agree that it takes a man with a very stiff backbone to fight a proposition of the kind through to the end. So I never did blame very seriously those who gave way on this occasion.

I think you will agree that one of the most difficult bodies of men in the world to lead is a body of medical men. They are trained from the time when they enter their profession to independence of thought and action—trained to rely upon their own judgment—and it is difficult to get them to give up their individual opinions and surrender their judgment to a few men at the head of affairs. It is the old story of the bundle of sticks.

As you all know, in a measure we were beaten. On the 22nd December the Association, at its final meeting on that phase of the question, decided to release the men from their pledges, because it found that many of them were breaking away, and therefore considered that that was the best course. The Association released the men from their pledges, and they were free to take work under the Act. Here is where the bitter pill comes in: we knew that the Government were beaten—that they had to get medical men to go on the panel list before the 31st December. If the doctors had kept quiet until the 30th December the Government would have been bound to come to us and ask for our terms, because they had to organize the service for fourteen million people before the 15th January. However, we gave in, and the result is that the Act is in force, and the British Medical Association have had a very serious time of it.

Apparently there was a danger of a split, but I think that the Association has come out of the struggle stronger and more united than before. The present position is this: the medical profession are getting more money than they got under the old friendly-society system, but how it is divided has not been worked out accurately. Whether it is an actual gain to the profession, or whether the money is transferred from the pockets of one part of the profession into the pockets of another part, has not been ascertained. There used to be only four or five million people working under the contract system; there are now some fourteen millions.

Our definite opinion is that contract service is not the highest form of medical service. We say that the individualism of the medical profession is a great asset, not only to themselves but to the nation. The best way of working is, I think, a contract between the medical man and his patient. We say that that is perfectly possible, even with an Insurance Act. There is no reason why the Government should not hand over the control of medical insurance to medical men. That would be the ideal system, and if an insurance system is to be introduced here you should strive to get it established on some such plan. It is the ideal form of service, and it is being carried out in certain areas in England. The medical men there organized a service in their own areas, and there is no restraint whatever upon them in the working of the system. We would say, let the Government insure the workers not for medical benefits, but for the cost of medical benefits. Let the worker have the money, but do not interfere with his liberty of contract with any medical man he may choose.

The medical men are dissatisfied with the English Act, partly because of its being forced upon them, and the irritation is still there. They are also dissatisfied with it because under it they have to do a certain amount of clerical work which is of no use to them or to any one else; and they are dissatisfied, further, because they are put under the control of a lay body, on which they have not sufficient representation. The only minimization of that is that the Government have permitted us to establish local Medical Committees. We have arranged for this improvement, and that all contracts should be carried out by the local Committees, so that one man could not break away from the others in dealing with the Insurance Committees.

The persons insured under the Act are not satisfied with the medical scheme. The working-people say that the service they are getting now is not as good as it was under the friendly societies. I do not think that is true, except possibly in cases where a man has so many names on his panel list that he cannot properly handle the cases. There are cases where a medical man has three or four thousand persons on his panel list, and it is impossible to deal with such a number. The unlimited panel list is undoubtedly an error.

Now, I would say that if you in these dominions are going to be up against such a thing as a National Insurance Act, my advice first of all would be that you should formulate your policy early and know exactly what you want. Do not make your demand a rigid one. It is of no use going to the Government and presenting a pistol in the form of an irreducible minimum. Formulate your policy clearly and carefully as regards what you are prepared to take. Secondly, get yourselves thoroughly organized. Every man in the profession ought to be a member of the British Medical Association. I say that in all sincerity, because every unbiased man must know the amount of work the British Medical Association has done for the profession. It is, in point of fact, the only body that can do good for the profession in such matters. In carrying out the organization you should have a paid Organizing Secretary, who can go about the country from district to district, and keep the doctors in the various areas thoroughly informed as to the condition of affairs in the other areas, and keep them in touch with each other. In England we have found that the men in the west did not know what was happening in the east, neither did those in the north know what was happening in the south. All sections of the profession must be kept thoroughly informed. The third point—and it is one that I want to press home—is that you should have your defence fund before you begin your fight. We hear men in our part of the world grumbling at having to pay a couple of guineas as members of the Medical Association, though they ask the Association to do a great deal for them. Yet in England we find that the average working-man pays into his club from six to eight guineas a year. Why, then, should medical men, with incomes much larger than those of the working-men, and with the dignity of their profession to keep up, grumble at having to pay only two guineas? If you are going to carry on anything like a fight in the defence of your principles against an Insurance Act you will need to put your hands into your pockets and pay for it, but do not let it be too late before you begin to make your preparations. You ought to have the defence fund ready—not try to organize it when the fight is on. That is all I have to say at present. I am very much obliged to the meeting for listening to me so patiently, and I am now prepared to answer any questions that may serve to elucidate the matter.

QUESTIONS AND DISCUSSION.

A Member: Are we to understand that nothing is expected from a medical man working under the English Act beyond attendance upon the insured person?

Dr. MacDonald: Nothing whatever.

Q. In practice does it work out that any considerable number of medical men tacitly give attendance on the families?

Dr. MacDonald: Not to my knowledge. I think there is no known instance of the kind.

Q. How are the families—the wives and children—provided for? Are they reckoned as separate members?

Dr. MacDonald: They are not insured at all. They are treated as private patients. There may be clubs that include them, but they have nothing to do with national insurance.

Q. Has any calculation been made in England as to the extent of the defence fund that would have been required—any calculation by actuaries or business men that would guide us in the States of Australasia as to the relative amounts we should require?

Dr. MacDonald: There has been no estimate at all. We simply went to the members of the profession and asked what they were prepared to guarantee in case a call was made upon them. It was simply to be a guarantee fund, to be used in case a call might be required to reimburse any man who suffered loss through standing by the Association. We have mitigated a number of cases, but we had not enough at our disposal to be able to say that every man would be reimbursed who suffered loss in that way.

Dr. Kenny (Melbourne): Might I offer a suggestion on this point. In considering the question of an indemnity fund in the Council of the British Medical Association in Melbourne it occurred to us that a very good plan would be to take the advice that Dr. MacDonald has given us to-day—that we should ask the members of the profession to put whatever amounts they could afford into an indemnity fund. Supposing that Dr. A is prepared to give £100 to the fund, we would accept it and put it out at interest; and we would pay Dr. A the interest until occasion arises for using the fund.

Dr. MacDonald: We in England were not so generous as that. We put the money out at interest, but we put the interest into the fund.

Dr. Read: In case a man has a wife and, say, seven children, how does he provide for the children? Some of us have been given to understand that he provides for them through the friendly societies, paying 2d. a week for the wife and 1d. for each of the children up to two, and that any further children are attended free. If that is not correct, will you kindly state how the family are provided for?

Dr. MacDonald: There is no friendly-society provision for that at all. It is entirely a side-issue. If the medical man of a district is prepared to take a club associated with a friendly society, he makes what terms he likes with the club. The friendly societies of England do not provide for the wives and families of their members in any shape or form. Under both the friendly-society system and the National Insurance Act the only person insured for medical attendance is the working-person himself. The families are entirely a matter for private arrangement. Some have got up clubs, and in some areas the families are provided for as a side-issue to the national service. Generally the arrangement is that we take them on the same terms as under the Act —8s. 6d. for an adult, such as the mother of the family—and then take the children at a reduced rate. For an adult over sixteen the 8s. 6d. rate would be paid. So that if you have the father and mother, a grown-up son, and a grown-up daughter you would have £1 14s. paid out of that house for medical attendance. So it is recognized that the children should pay less—in some cases 6s., and in some 4s.—until they come to the age at which they become insured persons under the Act. In cases of large families a reduction is made—*e.g.*, that not more than four children should be paid for. That was what we thought was the best arrangement.

Dr. Springthorpe: Can Dr. MacDonald tell us what has been the effect of the Act upon the friendly societies?

Dr. MacDonald: It has wiped club practice out as far as the worker is concerned, but there is still club practice under arrangements for wives and families. The friendly societies themselves are of opinion that the operation of the Act is going to wipe the friendly societies out in the course of a few years.

Dr. Carruthers: Is it a fact that experience under the Act has proved that medical men can do better than they expected?

Dr. MacDonald: That question presupposes that I know what the medical men expected. We know what they said at our meetings, but what they really expected in their hearts it is difficult to say. What we can say is that most medical men are to-day under better conditions than they dared to hope for, because we have got better conditions than were at first offered. Mr. Lloyd George at first asked us to provide medical attendance for 4s. 6d. a head. We are now getting under the Act 7s. a head at least, with a possibility of 7s. 6d.

Dr. Carruthers: As a matter of fact, has not the income of medical men been greater?

Dr. MacDonald: Yes, that is so.

Another Member: But their work has been greater.

Dr. PURDY: In my opinion, the medical men in England are better off under the National Insurance Act than we are in New Zealand under the friendly-societies system. Here a medical man gets £1 for attending a member of a lodge, his wife, and the children in the family under sixteen, and in some cases the grandmother and grandchildren. In England, if he attended the father, the mother, and one child he would get £1 3s.—8s. 6d. for each adult and 6s. for the child.

Dr. MACDONALD: But do not make any mistake. The National Insurance Act provides for only one person.

Dr. PURDY: Still, the payments are made; but here we attend the parents and families for £1, inclusive of medicine. The thing is absurd.

Dr. BUTLER: What is the average fee that a medical man would get for ordinary attendance upon a patient of this class?

Dr. MACDONALD: About half a crown, for a visit at the house.

Dr. SCOTT: It has been stated that certain extras are granted. Will you kindly say what are the extras?

Dr. MACDONALD: There is no classification of extras. We tried to get a classification of extras introduced into the Bill, but Mr. Lloyd George would not hear of it. The position as to anaesthetics and a second opinion is curious. It was understood that that was part of what the man of "average skill and ability" had to provide. We had an interview with Mr. Lloyd George, in which I said, "You provide here that a doctor has to give anaesthetics to his patient if required. You also have no provision for a second opinion. He has to give that himself." Mr. Lloyd George said, "No, not quite that, but if he wants it he has to pay for it." So that under the original Bill the medical man had either to give the anaesthetic himself or pay another man to do it. My reply to Mr. Lloyd George was, "Do not you see that you are actually putting a premium against a man giving the best possible advice to his patient?" The result of our remonstrance was that they went so far as to allow a man to receive a second opinion and pay for it himself, but the doctor is still called upon to either give the anaesthetic himself or pay for it out of his own pocket.

Dr. BRENNAN: Can you tell us what has been the effect of the Act upon the friendly societies in general?

Dr. MACDONALD: I will try to answer that, though it is a difficult question. When Mr. Lloyd George introduced the Act he led the friendly societies to believe that the administration of the medical benefits would be in their hands. But when he found that there were fourteen million persons to be insured instead of four or five millions, he admitted certain other bodies to the handling of the administration, and called them "approved societies." In England there is a body called the Prudential Insurance Society, which is probably the best-organized society in the country. It has a collector in every village or hamlet. In the course of the first year of the operation of the Act this society had over three millions of the insured persons on its lists. Under the society's system its collectors go from door to door collecting the moneys due by the insurers, and paying back to the insurers any moneys due to them. Under the friendly-society system the members have to go to their clubs to pay their dues. The operations of these later insurance societies are killing the friendly societies, who themselves say that they will not be able to hold out for many years longer unless they get an amendment of the Act. They are making a tremendous effort to get it amended. Some of the smaller societies are already bankrupt, and many of the others are going the same way.

Dr. MORRIS (Adelaide): How does the Chancellor define a working-woman? Is the wife of a labouring-man a working-woman if she goes out to work, say, one day a week?

Dr. MACDONALD: Yes. If she goes out working one day a week she becomes a worker under the Act.

Dr. CARRUTHERS: What has been the effect of national insurance upon the class of people who in the past have not paid a doctor but have got free attendance at the hospitals?

Dr. MACDONALD: That is one of the advantages of the Act—that it has done away to some extent with the attendance in the out-patients' departments of the hospitals. A certain number of people now pay the doctor who never paid before.

Dr. SPRINGTHORPE thought that the difficulty with regard to domestic servants who fell ill might be overcome by an arrangement under which the money they would receive under the Act might be utilized to keep them going without their leaving the household.

Dr. MACDONALD: The difficulty is that the servants will not have it. They say that they are entitled to get 7s. 6d. a week benefit and they are going to have it. That plan has been tried in many cases, and has resulted in the mistresses being mulcted in the cost of keeping the servants and the servants being still allowed to have the 7s. 6d.

Dr. WORRALL (Sydney) asked what field was now covered by the work of the friendly societies.

Dr. MACDONALD: As regards medical benefits, the societies have nothing whatever to do with them as far as the worker himself is concerned. They may have as to the wives and families, but not as to the insured persons. But some people who are insured still pay their old lodge dues, in addition to the insurance-money. They do not get additional medical benefits, but they get additional sickness benefit.

Dr. SPRINGTHORPE: Who pays for the wife of a working-man when the woman stays at home—when she is not a casual worker under the Act?

Dr. MACDONALD: If she is in an "approved society" she is paid for out of the Insurance Fund—receiving full rates for twenty-six weeks of illness, and then half-pay for as long as she is ill.

Dr. PURCHAS: Is the Act administered solely by the local Committee, or do such associations as the Prudential assist in its administration?

Dr. MACDONALD: People can insure through any "approved society." The whole of the administration is in the hands of the Insurance Committee. The Committee hand the money to the societies to distribute the benefits.

Dr. COLLINS: There is a class of persons who insure through the Post Office—men who cannot get into, or have left or been expelled from, an approved society; they are practically the derelicts of society. How do these people get medical attendance?

Dr. MACDONALD: They put their names on a doctor's list, the same as those insured through a society, but they are not insured at all—they simply make a deposit, and their benefits are paid out of the Post Office Fund. As soon as the amount they have deposited with the Post

Office is withdrawn they are cut off from every benefit. We have to remember that the people dealt with under the Act are not selected lives—every worker has a right to come under the Act.

The CHAIRMAN expressed to Dr. MacDonald the thanks of the meeting for his lucid explanation of the national insurance system, and asked those present to signify their approval of a motion for a vote of thanks by acclamation.

The motion was agreed to accordingly.

Dr. MACDONALD thanked the meeting for its expression of approval of his address, and for the attention it had given to his exposition of what was really a very intricate matter.

EDUCATION AND EUGENICS.

Lecture delivered by Dr. TRUBY KING before a meeting of members of the Congress and invited guests.

UNTIL the day before yesterday I understood that I was to speak to an audience composed entirely of medical men; therefore, what I intended to say was naturally somewhat different from what I have to give to a gathering which consists largely of those directly concerned in teaching. The question of education is one in which the members of our profession should take a great interest, and upon which they are able to throw a great deal of light. After all, it is before them that the results of education come, in so far as the effects upon mind and body may be unfortunate.

At the very outset I should like to ask the question, "How have we arrived at our present system of education?" Prior to the fifteenth century there was practically nothing in the way of what we now understand by education.. I was very much struck the other day, when in the Record Office in London, at seeing, first of all, the Domesday Book, which is written in the most perfect handwriting, and beside it the signature of Richard the First, which is given as the first signature of a Norman King. I must say that it was not a signature which would be considered creditable in a primary school. As a matter of fact, prior to that time the main consideration was physical, and not mental, fitness. The great impetus which came about the fifteenth century was due to the discovery of the New World, to the invention of printing, and to the rediscovery of the classics. In the Middle Ages what had been done in Greece and Rome had been almost entirely lost sight of, except as regards the learning of the monastic orders. Education was essentially for celibates. From the fifteenth century onwards there was a growing recognition of the importance of the learning of Greece and Rome. The "classics" came to occupy a paramount position in the consideration of thinking men, because, except in the classics, there were no records available of any advanced civilization. People looked to ancient Greece and Rome as affording lessons which they could not possibly get in their immediate vicinity. The result of this was that an understanding of Greek and Latin was considered essential. Those languages and mathematics became the foundation of the education of Royalty and of the privileged classes, and gradually the same kind of culture became more and more diffused throughout the whole mass of the community, and more and more intensified.

No one can question that in the first stage this was highly beneficial; but we know that as early as the times of Dickens and Kingsley distinct warnings began to appear as to the injurious effects which high pressure in education was even then producing. We have Dickens's account of Dr. Blimber's establishment, where the doctor, having always on tap enough learning for a hundred, made it his joy and pleasure to cram it into the unfortunate ten. And we know the effect of this upon young Toots, with whom, as Dickens says, the doctor had rather overdone it, so that it was said that when he began to have whiskers he left off having brains. Then we have the scathing satire upon overpressure and examinations in Kingsley's "Water-babies." Further, we have Herbert Spencer's masterpiece on education, in which he pointed out the scientific bearings of the subject, and particularly indicted the civilization of the day for its irrational education of girls—that what they were being taught had practically no bearing on home life, wifehood, and motherhood.

We came by our education system in general in the way I have indicated, and it was recognized half a century ago that the system, when injudiciously pursued, was having an unfortunate effect upon both the bodies and the minds of the pupils. At that time the criticism was mainly directed towards the effect it was having on boys. Well, now, how was it that we came to institute the present system of education with regard to girls? I do not think anything more terse or more illuminating in its way has been written on this subject than what we find in G. K. Chesterton's book "What's Wrong with the World?" in which he says, "I am often asked what I think of the new ideas about female education. But there are no new ideas about female education. All the educational reformers did was to ask what was being done to boys, and then they said, 'Let's go and do it to girls.' . . . No root query of what sex is, of whether it alters this or that, and why—nothing but plodding, elaborate, elephantine imitation."

What have been the actual effects of this system of teaching with regard to girls? I shall return to that question later. In the meantime let me deal with the question of so-called eugenics.

What is eugenics? We all know that it is systematized effort in the direction, first of all, of finding out what are the factors that tend towards improving the race from generation to generation; and, secondly, it deals with the measures which tend in the direction of bringing about that improvement by concerted effort. Galton's work on this subject was essentially in the nature of inquiry—largely laboratory work—and even to the end of his life he was doubtful whether the matter should be pressed in regard to the public, because he thought there were scarcely sufficient data available. However, the matter was forced into publicity owing to the tendency which was manifesting itself towards degeneration of the race in certain directions, and especially by the alarming statistics which were brought out by Professor Karl Pearson—statistics which showed that while our birth-rate was unsatisfactory numerically it was particularly unsatisfactory with regard to the proportion of children born to the people of the best classes. When I speak of the best classes it will be understood that I am not using the term in the conventional way, but as applying to the people in any class who are most capable physically, mentally, and morally. There was no question as to what was going on. Any investigation showed that the main supply of children was coming from the less capable, and even from the degenerate classes—that the families of these people might average six, whereas amongst the more capable classes the number did not amount to more than two or three. The Eugenics Education Society was a society formed to pursue such inquiries as had been indicated and suggested by Galton, and further to see what could be done immediately, in a practical way, to spread a knowledge of eugenic principles, and to gain public interest and attention for them. Of course, there is no doubt that the work of such an organization must tend to be highly beneficent.

In dealing with the word "eugenics," I think the first thing that would suggest itself is the question, "Do you hold that nature or nurture is the more important point?" In other words, "Do you think that the heritage with which a person is born is the more important thing, or is it the environment—physical, mental, moral, religious—in which he is placed that will be more important for the race?" Galton undoubtedly attached more weight to heredity; at least, his investigations went mainly in the direction of seeing how far the inborn nature of the individual—the question of what his forbears were—influenced the individual and his progeny; but he contemplated also the influence of the environment.

The policy of the Eugenics Education Society has been to concern itself mainly—almost wholly—with the question of the effects of heredity. The result of this upon the public mind has been to convey the idea that anything done to help matters after the individual has come into the world would be of very little importance indeed—that it might be of some importance with regard to the individual, but that it would be of almost no importance with regard to the race. The public have come to use certain phrases very glibly of late years, and these phrases tend to have a decided influence upon conduct. I have been written to on this subject by several newspaper editors and others, who have pointed out the disquieting effect of these ideas on the community, and I have been asked to write combating this. Women are beginning to say, "It does not seem to matter what efforts we make, or what trouble we take to keep ourselves fit—we can no longer hope that it will make any difference with regard to our offspring." Thus one of the strongest incentives to physical and mental fitness tends to be removed. People talk glibly about "the integrity of the germ-plasm," and about "inability to hand on acquired characteristics." Dr. Saleeby points out, in the *Eugenics Education Review*, how unfortunate it is that the public have taken up these shibboleths in the sense in which they have. He points out that the germ-cells are not essentially different from any other cells of the body.

Before people can understand a problem of this kind they must be perfectly clear as to what we mean by the terms in which it is stated, and also as to the essential facts with regard to cell-life. Above all, it is necessary that they should realize the effect of what Professor Quinton recently said—that every living cell in the universe still lives as the first cell struck out of dead matter lived in the primitive ocean—that every living cell of our bodies lives in an aquarium. It exists in a fluid which is comparable to the ocean. From that fluid it takes the material necessary for its nourishment and growth, and it casts into that medium the waste and poisonous products that result from its own activities. Further, up to a certain stage it has the power of reproducing itself; but the fundamental function is nutrition—reproduction being essentially a phase of exuberant nutrition—nutrition carried beyond the needs of the cell, and enabling it to throw off matter and energy which suffice for the setting-going of another cell. We must clearly understand that, and having understood it, and knowing that it applies to every cell from the amoeba to the highest brain-cells of man, and that it applies equally potently with regard to the generative cells—the "germ-plasm"—we shall understand that these cells are no exception to the laws of life—that "integrity of the germ-plasm" does not mean exemption from the laws of nutrition and growth. The fluid in which the germ-cells are placed must be adequately supplied with nutrient materials in the proper proportions, and it must be kept free from poisons. It must be remembered that every living cell, even of a healthy being, is a poison-factory—that we are only defended from being poisoned by the operations of our kidneys and lungs and the excretory organs generally. What is the effect of excess with regard to alcohol, the waste product of yeast-cells? It is to tend to dwarf the growth and the potentialities of the germ-cells amongst which it circulates. And it is not the only poison to be considered. Almost equally deleterious poisons are those which result from maternal indigestion and constipation—indeed, from any lack of proper health, such as may result from lack of deep breathing and proper action of the muscles and other organs. The most obvious poisonings are those incident to unduly sedentary life, the poisons in this case including those which arise from the activities of the bacteria which cause fermentative and putrefactive processes in the alimentary canal. In the case of a mother these poisons cause a stunting of the growth and potentialities of the germ-cells of which she is the host. Understanding the simple fact that every cell of the billions of which we are composed lives in an aquarium, and affects and is affected by the contents of that aquarium, you will be able to estimate the harm of the erroneous popular notion —which, as Dr. Saleeby says, is practically universal—that "integrity of the germ-plasm" means that germ-cells are like the sovereigns which a man carries in his purse, and which can be handed on unchanged from one generation to another. The idea is palpably ridiculous. It is true that we are unable to hand on such acquired characteristics as the special development of one's biceps, or a particular mental attitude which we have specially developed; but one can hand on a general condition of fitness or unfitness—either good potentialities that will make for a healthy, vigorous being in the next generation, or, on the contrary, we may hand on weakened or exhausted potentialities which tend in the opposite direction.

Who is to say that heredity has not been built up by environment? We have every reason to believe that it has—that heredity represents the summation of the effects of environment. I suppose that the greatest authority at the present time on these matters is Professor McDougall, of the Carnegie Institute, Washington. The energies of that institution have been directed largely towards the elucidation of these problems. Dealing with plants, which are simpler than animals, Professor McDougall and his assistants tried the effects of injecting minute quantities of solutions of sugar or salts into the ovaries of plants just before fertilization. And what did they find to be the result? That there was a great increase in the proportion of mutants and variants. These results were published some years ago, but I have not seen the more recent reports of the Institute. In conclusion, Professor McDougall expressly pointed out that his results showed fundamental, transmissible changes, brought about by experimental alterations in the fluids bathing the germ-cells. Whether he was right or wrong in regard to his experiments, his conclusions showed that there was no scientific warrant for stating dogmatically that there is an "integrity of the germ-plasm"—at least in the narrower sense—or that heredity is racially more important than environment. I must say that I am in sympathy with a remark which was made many years ago at a meeting of the British Association—that "environment can knock heredity into a cocked hat." And it is very encouraging to us that it should be able to do so, because we cannot alter the inherited nature of the individual—that which has come down from tens of thousands of years back—but we have every control over the environment. We ought to make the environment for all human beings such as will conduce to the stability, progressiveness, and permanence of the race. So much for the question whether heredity or environment is the more important point in practical eugenics.

There are two other shibboleths to which attention has been drawn in the *Eugenics Review*. One is the term "congenital." Dr. Saleeby says it is most unfortunate that we have come to attach the meaning we do to this word, and he wishes that the term were abolished because of the misunderstanding with which it is associated. "Congenital" really means "present at birth," but we forget that the individual is virtually born—*i.e.*, heredity is decided—at the time of conception, nine months before birth. The individual is alive—is surrounded by an environment—and the fitness of that environment, the condition of the "aquarium," depends upon the habits and health of the mother. She provides an environment which is either good or bad—which tends in the direction of benefit or the reverse. In my own specialty (mental diseases) we have the term "congenital idiot," or "congenital imbecile." That is supposed to mean that the imbecility or idiocy was present when the individual was born. But modern investigation goes to show that a large proportion of "congenital imbeciles" have been made imbecile during the first nine months after birth. In other words, the stunting and derangement of the brain and nervous system have resulted from fermentation and disease arising from maternal ignorance and improper feeding, &c. Professor Lugaro, one of the highest authorities, says, "The infections which arise in the first years of life, and especially the inflammation of the stomach and bowels—the result of unsuitable feeding during lactation—are the most important factors in determining the majority of cerebropathies (brain-maladies), and in this way a crowd of idiots, imbeciles, and epileptics is produced, who encumber asylums, and are an enormous drain on the internal economy of the country, as also on public charity."

Regarding the word "congenital" in this light, we can see how important it is that the woman should have a proper training to make her a fit mother for her child. I say that if a mother understood these things—if she understood their bearing, not necessarily in the strictly scientific sense—she would realize that it is essential to the interests of the race that she should keep herself and her daughters in the best possible physical condition. On the other hand, educational authorities should understand the paramount importance of this matter, and realize that it is not a question of what we may call "Sandow fitness" That is not what is needed in the case of woman, but a harmonious, all-round development of the whole of the functions and of the bodily organs, which, indeed, would exclude an undue development of the voluntary muscles on the Sandow principle. As regards the muscles, what is important to her is that there should be a due development of the external abdominal muscles and the involuntary muscles of the internal organs, and we know that by the irony of things the development of all the abdominal muscles is most grievously hindered by our customs with regard to dress. Physicians are agreed that this is the most serious hindrance to the proper development of the abdomen. It was expected fifty years ago that if you got a good development of muscle and a good development of brain, that would be almost enough for the building of the complete individual. Professor Stanley Hall and the leading authorities in England are agreed that among highly athletic modern women there is a tendency not to have children, or, if they have them, there is a tendency not to be able to nurture their offspring. Obviously, if an undue proportion of the energies and the blood-supply go to the brain and the voluntary muscles, there will not be enough left for the rest of the system. Herbert Spencer spoke of the flat-chested over-pressure girls of his time, and their unfitness for maternity. His idea was that they wanted a fuller physical development. Of course, we are absolutely at one with regard to that, but the development must be harmonious and proportionate. Further, Spencer could not have fully realized what, in fact, has only since been discovered—viz., the effect of what may be called "cumulative fatigue." It was said in his day that change of work or of occupation was recreation. That was true to a certain extent, but schoolmasters came to assume that active exercise would nullify the effects of overpressure with regard to mental work. However, modern investigation has absolutely established the point that, except in the strictest moderation, physical exercise, when superadded to mental effort, produces cumulative fatigue—that is, it actually makes the position worse with regard to exhaustion of the individual and the poisoning of the system with "fatigue products."

Well, what does all this mean? Obviously, that in the education of women we want far more rest, far less pressure, and we do not want the total sum of the mental tasks to be anything like what they are now. Also, by giving due attention to matters which are of special interest and importance to women, and along which many of their best aptitudes go, we should be enormously lessening the strain. In other words, in so far as we can introduce matters connected with home life, and give them a greater interest, we shall be doing an enormous benefit to the women, and prospectively to the race.

I will now come to the question of what has been said by leading authorities as to the actual results of the modern education of women. The greatest authority on the education of adolescents is Professor Stanley Hall. He started out with all enthusiasm for what is called the higher education of women — that education which Chesterton says is essentially a "plodding, elaborate, elephantine imitation" of man's education. Stanley Hall had originally every confidence that, provided the physical powers were highly developed at the same time, our so-called "higher education" would prove a good thing for the individual and for the race. He admits now that he was mistaken. He takes the results in the United States, and finds that among the women graduating from the colleges there is a small proportion of marriages and a very small proportion of births, that the progeny are inferior, and that there is inability on the part of the mothers to nurse their offspring. He points out how magnificently developed, from the athletic point of view, the women of the higher colleges tend to be—how splendid they are at golf, hockey, tennis, and similar games, and how efficient many of them are mentally—but he says the tragedy is that they do not tend to make good wives and mothers, and there is often a repugnance to home life. "These women," he says, "are often in every way magnificent, only they are not mothers, and sometimes have very little wifehood in them; and to attempt to marry them to develop these functions is one of the unique and too frequent tragedies of modern life and literature: some actively deplore the necessity of child-bearing, and abhor the limitations of married life; they are incensed whenever attention is called to the functions peculiar to their sex; and the careful consideration of problems of the monthly rest is thought 'not fit for cultivated women.'" Stanley Hall says that we must turn back on our course, and we must understand with regard to girls that nothing ought to be done during school life that will interfere with the power of and inclination to maternity later on.

Now, I am glad to be able to give you the gist of what seems to me one of the most important pronouncements I ever heard on this subject. It is an address which was delivered at the recent London Conference on Infant Mortality and Child Welfare, by Dr. Caroline Hedger, of Chicago. Her address impressed us all very greatly, for Dr. Hedger was intensely earnest, and intensely devoted to the education and welfare of women. She has had the higher education herself, and believes in a truly higher education for women, but she considers that even the ordinary modern education for girls is misdirected, and that it does not conduce to make women fit or inclined for motherhood, or for the adoption of the more womanly callings in life. I shall read some extracts from her paper, because they seem to me so important that I have not the right to paraphrase what she said. The subject of the paper was "The Relation of the Education of the Girl to Infant Mortality." Dr. Hedger said, "We hear of the ignorance of mothers who feed and care for their babies so badly that they die. Why do they die? Because the education to which we have subjected a girl up to the present has had nothing, and even now contains very little, that will help in the tremendous responsibility that falls on her in carrying forward the race. I wish to call attention to the widespread and absolute indifference as to the effect of education on the reproductive life of the girl, even in relation to the establishment of a reasonably normal menstruation."

Her personal experience as physician to an establishment employing some four thousand girls, all coming from ordinary schools—not high schools—led Dr. Hedger to suspect that "the girl as she comes from the school presents a vast amount of inefficiency, due to menstrual disturbance"; but she could not determine which was more at fault—the life at the school, or that in the home. Dr. Hedger showed tables demonstrating the relationship of abnormal menstruation to constipation, and said, "The period of reproductive development of the girl coincides with her school life, and if we force her into the school we must undertake not to injure the material."

Turning to the effects of so-called higher education, Dr. Hedger said, "In the register published recently of Wellesley College, one of the largest women's colleges in the United States, are the records of 8,000 women who have been in attendance. From 1879 to 1900 a total of 4,448 women were in the college. Of these, 2,096 have never married; 1,001 have married, but have no surviving children; 1,351 have married and have surviving children numbering 3,138—1·3 child per family of all the married in the group, or 0·07 child per woman for the whole group of 4,448. Compulsory education in this school would certainly put Malthus's ghost at rest for several centuries. The new President of Wellesley College, installed last year, gave her inaugural address on 'The making of Citizens.' She stated that colleges had nothing to do with parenthood, and the figures from her own college certainly bear her out to quite an alarming extent. The 1,001 families with no children speak eloquently of four possibilities—(1) They could not reproduce; (2) they could not bring about the survival of their children; (3) they were unwilling to undergo the sacrifice, the fatigue, the limitation of intellectual and social pursuits—all necessary for the working-out of the vast plan of evolution; (4) they could not withstand the economic pressure."

Nothing was more important than the evidence given by Dr. Hedger as to the relationship between constipation in the case of girls of unduly sedentary life and failure in regularity of menstruation. She showed that these two factors went together—that if there was constipation there was also a defect with regard to the other function. Yet there are known to me personally large educational establishments in which the lavatory accommodation is nothing like what would be absolutely necessary if there were to be regularity with regard to the action of the bowels. You strike a blow at the very nature of the human being when you deny facilities in these directions to women. Dr. Hedger went on to deal with other instances in point, and I may say that subsequently I had a long talk with her on the subject. I then contemplated returning to New Zealand by way of the United States, and making personal investigation into the question, for she said to me, "I do not want you to take my word for it. I should like you to go to Wellesley College and other institutions and form your own conclusions."

In the discussion which followed upon the reading of the paper, Dr. Saleeby said, "The education of a girl must be to prepare her for womanhood, and not to show that at a pinch she could be a boy."

Dr. Mary Booth, for many years medical adviser to the Education Department of New South Wales, endorsed what Dr. Caroline Hedger had said, and continued, "She herself found that, particularly in high schools, the injurious effects of overpressure on health were apparent in a large majority of the students. . . . One could not expect boys and girls to work long at the same rate. . . . With the high pressure of education the girl went home and was busy with her school-work, and saw nothing of her brothers and sisters. She was divorced from home interests, and therefore lost taste for a contented home life. The education of a girl should develop the sympathy between mother and daughter, yet the education of the high-school girl of the present day was creating a divorce between parent and child, instead of fostering unity and sympathy, and set the woman seeking for interests outside her home life."

Dr. Ballantyne, the great English authority on ante-natal conditions, speaking from his observations in America, remarked the disastrous effects on the birth-rate of the prevailing educational overstress. Further, when speaking in general as to the recognized tendency of overathletic women to fail as mothers, he says that a noted hockey-player told him that nearly all her fellow-players who had married had found themselves unable to suckle their babies.

A distinguished London professor of gynecology said to me, speaking of the lack of maternal aptitudes and inclinations in the West End, " The worst, undoubtedly, are the Americans who come here. They tell you flat out that they are not going to bear children—they have no intention to face the troubles of child-bearing."

Dr. Murray Leslie has sent me a paper of his which was published in the *Eugenics Review*, in which he says, " During the last few months no fewer than three young brides, all splendid specimens of humanity, frankly and deliberately stated in my consulting-room that they did not want to have children, partly for economic reasons, and partly because of possible interference with their social duties and recreations. I am stating facts—I leave my readers to draw their own conclusions. . . . I should be the last to wish that the interesting, independent English girl of to-day should revert to the mere ' hausfrau.' I am only asking her not to sacrifice her race in her efforts to secure her own self-development. The eugenist sees in her the probable ancestress of the finest race the world has ever seen, if she will only realize her unrivalled opportunity."

When we were dealing with this subject at the Annual Conference in Auckland two years ago I quoted from Dr. Arabella Kenealy, who pointed out that to make progress from the biological point of view we must not try to produce neuters ; that the scheme of progressive evolution always went in the direction of differentiation ; that in the education of a boy you wanted to develop the virile qualities, and in the education of a girl you wanted to specially develop womanly qualities—to make her different from the boy. It was not a matter of regarding her as mentally inferior. Of course, we all recognize that women are our equals, not our inferiors ; but our lives should be complementary and helpful to each other, not antagonistic. The question of competition between the sexes is one of the greatest evidences of the decadence of our modern life and education.

I have in my hand a publication which was issued some years ago by the Board of Education in London with regard to reform in the education of girls, but, unfortunately, very little has been done under it—the system was not compulsory. In France a good deal is being done in some quarters. Thus, every girl attending school in the large district of Versailles is sent to an excellent institution for babies, and has to spend ten days there, during which she has to take charge of a child—to feed it, bathe it, dress it, and attend to it in every way. Ten days is the minimum sojourn, but many girls stay in the establishment for much longer. They are provided with very comfortable quarters, and pay only a franc (10d.) a day. The French authorities are very strong on what they call " puericulture." In New Zealand, I am sorry to say, nothing of the kind is encouraged, except in a few schools. I speak from knowledge on this point. A large school exists near our baby hospital at Dunedin, and I offered to take a nurse and a baby there, in order to teach the girls something that would be of use and interest to them ; but, though the master was broad-minded and sympathetic, I was told that it would entail a sacrifice of the chances and position of the school to give up one hour on a single afternoon. At Versailles, as I have shown, the authorities require from the girls ten days' compulsory residence in an institution for babies.

At the Brisbane Congress fifteen years ago Dr. Lindo Ferguson inveighed against the harm that was being done to the eyesight and to the whole nervous organism of girls under our education system, and this was more than confirmed by others. At the Auckland meeting two years ago the President (Dr. Savage) heartily endorsed what was said by myself and the other speakers as to the evil effects of the pressure of modern education, and said it was his custom, in cases of menstrual irregularity, &c., in schoolgirls, to advise that the girl be kept away from school for a year. "Indeed," he said, "I very much doubt, in view of the pressure of modern education, whether we ought not to keep girls away from school altogether at this developmental period."

The officers of the Mental Hospitals Department, from the Inspector-General (Dr. Hay) downwards through the Superintendents, are all at one with regard to the harmful influence of overpressure in education. I have said so much on the subject myself for the last fifteen years that I need add nothing here. Dr. Tizard, who is the Superintendent of the only private asylum in New Zealand, said to me shortly before I went Home, "If you are going to speak on education at the Congress, there is one thing that I wish you would ram home—the large number of girls who are sent to us suffering from dementia praecox and imbecility, the result of overpressure in education." The medical officer of the Kent County Asylum, an institution with some two thousand patients, recently said exactly the same thing to me—that it was lamentable to see the number of bright, clever girls who were detained in such institutions as the result of injudicious stress in education. The general expression of opinion by physicians at the Congress two years ago was in the same direction. What I ask this meeting to do is to pass a similar resolution to that of two years ago, and to one which I was asked to summarize for the London Congress, and which it passed unanimously. The resolution, as I now suggest that it should be passed, is as follows: [See Report of Final Business Meeting.]

DISCUSSION.

The PRESIDENT was sure that all present would agree that they had just listened to a very interesting and instructive lecture. The only point he intended to refer to was the evolution of what he might call "the commercial flapper." You could see her walking through all the business areas of Auckland—a young girl of fourteen, with her hair in a tail down her back, a short dress, and high-heeled boots—he could not go into other details with regard to dress. It was very depressing to see young females at that dangerous age launched into commercial life when they really wanted protection. This class of girl had more or less thrown aside the reins of home government. He thought what was going on was an absolute tragedy. At the request of the lecturer, he would now ask the Hon. Mr. Holman if he would like to contribute to the discussion of the lecture.

The Hon. W. A. Holman said he came to the platform with the authority of the President, but he was bound to say that he felt very keenly the presumption implied in such an act. At the same time, where medical authority became the definite adviser of public action, those who were engaged in public action might, with every deference to the technical eminence of the students of the biological side of the problem, offer their views. It was only from that point of view that he took advantage of the invitation which had been afforded to him to make one or two remarks about the propositions that had fallen from Dr. Truby King in the course of his illuminating and valuable address. He must confess, as a layman, that he was one of those who had always shuddered at the word "eugenics." He had always regarded it as an illustration of biology run to seed in certain directions, just as many people probably regarded certain developments of the art of government as illustrations of democracy run mad. His own slight and superficial knowledge of the subject, gained from a certain amount of acquaintance with writings of the Galton type, had given him a conception of the modern trend of eugenics which had been radically amended by the lecture to which he had just listened. The views urged by Dr. Truby King were most encouraging and helpful views that might be set before the Governments and the public men of the world. He had rejoiced to note the tone taken by the lecturer, and his deprecation of the dismal fatalism which a misguided study of the principle of heredity had produced in the last twenty years. Dr. Truby King had spoken of the influence of certain medical writers, but another influence, that of Ibsen, had been largely responsible for the developments that had taken place in the public mind. People who knew nothing about heredity had read Ibsen's "Ghosts," and had been told that the sins of the father were reproduced in the second and third generations; and the same idea had been put forward in Ibsen's plays. Either Weismann's theory was true — that we could not alter the germ-plasm—or it was false. If it was false, and acquired characteristics could be passed on, it was necessary to see that every citizen acquired the best possible characteristics in order that he might pass them on. But now the eugenist came along with the proposition that the people of the future were to be developed from the degenerates of to-day. Here came the question, "Where did the degenerates of to-day come from?" Going back about twenty generations, it was found that the forebears of the British nation numbered at that period about a couple of millions. It was pretty evident that we had, roughly, the same ancestry—that all of us were drawn from a common stock. To cite his own case: his surname indicated that some distant ancestor of his came from Germany—probably centuries ago—but his ancestors, as far as he knew anything about them, had been settled in England for uncountable years, and to-day his family were as hopelessly and uncompromisingly English as any of their nearest neighbours. Those who, like himself, could trace their ancestry back to Saxon times would probably find that, though there were slight differences in the degree of infusion of other blood, there was a general common stock in those good old days, when there was no nonsense about eugenics or anything else, and the unfit simply passed rapidly out of existence. We all drew something of our present being from people who then existed, and about them there was no degeneracy. During the last fifty or one hundred years many thousands and scores of thousands of degenerates had come into the world. What were those degenerates but people who had acquired characteristics ? The degeneracy itself seemed to be an acquired characteristic, not a racial one. It was not drawn from the Anglo-Saxon stock, who resisted the invasion of the Normans ; and there were no signs of it in the spacious days of great Elizabeth. The degeneracy seemed to be the result of the altered social conditions of the nineteenth century. If the offspring of such degenerates were removed from the surroundings which had brought about their present condition, and given a return to the healthy environment which their more distant ancestors enjoyed, there seemed to be no reason why, if Weismann's doctrine was true, there should not be as satisfactory results from the next generation, under favourable conditions, as existed in days gone by. While he could see intellectual stumbling-blocks in the way of the crank eugenist—as distinguished from the medical adviser upon the education of the race, which was the noble and serious role that Dr. Truby King had taken in his lecture—he did not feel justified in dwelling upon such matters. Comments upon the weaker school of thought were really not relevant to the inspiring discourse the audience had just heard, but he could not refrain from putting before them a practical difficulty suggested by Mr. Chesterton as being in the way of the street-corner eugenist—the gentleman who wanted to regulate marriage—and that was that the people would not stand it. Mr. Chesterton said that if the result of the careful regulation of marriage was to bring into existence a vigorous and independent race, the first thing that independent race would do would be to knock on the head all proposals for the regulation of marriage. He felt strongly the debt that all present owed to Dr. King for stressing the matter of the derangement of the general health to which the conditions of modern society gave rise. The evils produced by drunkenness and by vice generally were of infinitely less importance to the community than the general sacrifice of mental and bodily tone produced as the result of the neglect of bodily health. More serious results were produced from indigestion than from other departures from the normal that were condemned as vices. He thought a time should arrive when failure to secure decent bodily health and a decent internal condition of the body would be condemned by the medical faculty as a vice—a vice which, probably more seriously than any other single factor, affected the fitness of the race for reproduction. He had felt his own mind and spirit rise in echo and response to almost every suggestion that had fallen from Dr. King. The necessity of amending the system of education, and the wider necessity which struck a public man of altering our social conditions so as to permit of a better and more rational system for our girls and young men—all these things appeared to be vital necessities, and he had rejoiced to hear them so luminously set forth. He hoped that the address would be reproduced in a permanent form, in order that the public might get the benefit of it.

Dr. Roth (Sydney), in seconding the motion, said he could not agree with the view that the function peculiar to women was an illness. It was a common failing amongst mothers and other people to regard it so, but it should be looked upon as an absolutely normal condition. Like other medical men, he was often consulted about young girls' eyes, and he had frequently been surprised at the attitude of the parents when they were told that the child ought not to go to school. What he usually pointed out on such occasions was that at that stage the physical development was more important than the mental development—that the one would end about the age of twenty-five, while the other would go on through life, so that it was better to sacrifice the mental side at the beginning to the physical. He was inclined to ask why there should not be examinations with respect to physical as well as mental conditions. Sometimes those who came out on top in the University examinations were narrow-chested persons and otherwise of bad physique. He would like to see a certain number of marks given to candidates of good physique. As to the lecturer's comments upon the prevalence of constipation amongst girls, he knew of many schools where the lavatory accommodation was exceedingly unsatisfactory—where it was such that he could not understand how a modest girl could be expected to use it. On the question of marriage, it was a common thing to hear a parent congratulated upon the engagement of his daughter to a man of wealth or position, without any regard for the consideration whether or not the man in question was in good health. Sacrifices were too often made for the sake of money or position. It would be much better if the choice were left more freely to the boy and girl. He would also like, as a matter of eugenics, to see early marriage encouraged.

Mr. George George (Auckland), Director of Technical Education, Auckland, wished, as an educationist, to speak in support of the resolution. He understood from Dr. King that the same resolution was passed two years ago in Auckland, and he would like to ask whether the meeting by which it was passed appointed delegates to wait upon the Minister of Education, and, if so, what was the result of the interview. He could only imagine that the result was nil. All who had had to struggle with educational matters here would know how difficult it was to overcome popular prejudice, and he was afraid that the root of the evil in connection with the education of girls lay in popular prejudice. Some five years ago, when speaking at a Conference of educationists in Wellington, he ventured to point out that our primary-education system was woefully defective, particularly with regard to the education of girls, and to say that it absolutely lost sight of the chief function which nature intended each girl to perform—namely, that of a wife and mother. He well remembered what a cold reception his remarks met with—practically nobody else in that Conference of New Zealand educationists considered that the subject of specialized education for girls was worth consideration. When he came to Auckland some eleven years ago he recommended that a start should be made towards giving girls such a training as would fit them to take care of homes by introducing the teaching of domestic science in the schools. The teachers of the city received those suggestions very coldly, and obstacles and difficulties were put in the way—obstacles and difficulties which he was happy to say had almost been removed. Even now, in considering the training of an exceptionally bright girl, there was a tendency for parents and teacher to take the view that it would be waste of time for Mary to go to a manual-training school and receive instruction in domestic science—that it would be much better for her to stay at the primary school, and even devote extra time to arithmetic and like subjects, because in that case she might pull off a scholarship. That was of infinitely more importance in the eyes of the parents and the headmaster than the acquirement of some little training in domestic science. Some six years ago an effort was made to introduce into the day course of the Auckland Technical College a domestic-science or homemaker's course, in which a girl would spend practically the whole of her time in studies that would be of benefit to her when she had a home of her own. But while girls would enter the commercial classes by the score, it was only with the greatest difficulty that he could get together a small class for the study of domestic science. Even now most parents preferred to sacrifice their girls to training for callings in which they could begin earning their living as soon as possible, by becoming proficient in shorthand and typewriting, and similar subjects, rather than have them devote a portion of their time to domestic science and subjects connected with the making of a home. To show the tendency of public opinion, he might say that a large number of girls would come to the Technical College for a year, and when they found that every girl, even if she was to become a " commercial flapper," was required to devote a considerable number of hours a week to receiving instruction in domestic science or homemaking, those girls would, at the end of the year, go to some private commercial school where they could apply the whole day to receiving instruction in shorthand and typewriting, rather than continue to get a general education. One point in connection with eugenics which many medical men lost sight of, and which he thought had a very important bearing on the present state of affairs, was the use of chloroform and other anaesthetics. Although the use of anaesthetics had been a great blessing to the race in many directions, it had also been a curse, in that it had enabled a large number of unfit persons to live and reproduce who would otherwise not have survived. Statistics proved the great fertility of the unfit, and he believed that that had had a great deal to do with the state of things as we knew them. He supported the motion very heartily.

Dr. MARY DE GARIS (Tilooburra) pointed out that even now it was men who were deciding as to what was to be done for the education of women. No woman was being included in the deputation which it was proposed should wait upon the Minister. Not being a New-Zealander, she was unable to suggest what woman should be appointed, but she thought it would be advisable to choose some woman Inspector of Schools. In the medical profession, as in others, there were two points of view—that of the man and that of the woman. She did not say that the woman's point of view was always better than the man's, even on questions affecting women, but her point of view was needed as well as that of the man. Great stress had been laid upon the training in domestic science. But training in domestic science was technical training. No man was trained for his trade—and she thought housekeeping could be called a trade—until he had received his general education. Why should a woman's whole education be directed purely to her trade? She had the same need as a man for a wide general training. It was from this point of view that she insisted upon the necessity of bringing women's opinions to bear upon education, and not merely those of their fathers and brothers.

Dr. TRUBY KING thought the remarks of the last speaker showed that there was a slight misunderstanding with regard to the constitution of the proposed deputation. It seemed to be thought that there was some fell purpose on the part of men in putting themselves on it.

Dr. Collins had been chosen because at the time he was a member of the Legislative Council and could give assistance in that capacity; Dr. Gibbs was Secretary of the New Zealand Branch of the British Medical Association; and he (Dr. Truby King) was included because of his interest in the subject. The idea of intentionally leaving out women had not occurred to anybody. As a matter of fact, he happened to be the head of a large women's organization in New Zealand, and it was a subject of chaff amongst his friends that he was supposed to be a rather special advocate of the cause of women. As to his interest in girls, he wished to see them fit and to have as many suitable vocations open to them as possible. His quotations during the lecture had been mainly from the utterances of women. He had given the woman's point of view at almost inordinate length. When he had spoken in England his audiences had been mostly composed of women. Women there attacked the present education system very strenuously. They thought a great wrong had been done to their sex because an education designed for men had been imposed upon them. He would be only too glad to see a lady doctor added to the Committee, and he would move, That the name of Dr. Elizabeth Platts-Mills, of Wellington, be now added.

The PRESIDENT pointed out that, as the present gathering was not a meeting of Congress, it would be necessary that the resolution be treated as a recommendation to Congress.

The motion was amended by the addition of the name of Dr. Platts-Mills, and in that form was agreed to.

Dr. TRUBY KING thanked those who had spoken in support of the motion. He endorsed what the President had said about "the commercial flapper." The President had given a picture which all must recognize and deplore. With regard to the remarks of the Hon. Mr. Holman, he (Dr. Truby King) felt that the most important things said at the present meeting were not those said by himself, but those of Mr. Holman, practically every word of which he could endorse. The remark about "biology run to seed" reminded him of a conversation which he recently had over the telephone with Dr. Harry Campbell, whom he supposed that most men in the medical profession recognized as one of the foremost thinkers in London on such questions. Dr. Campbell said, "I feel as if the public were absolutely hypnotized at present by pseudo-science; they have lost their bearings—lost their common-sense." He (Dr. Truby King) said, "But not by true science, which, after all, is a simplification of matters, making them clear." "Yes," said Dr. Campbell, "what would one call it? Let us see. Ah, it is seizing the essentials." He agreed with Mr. Holman that Ibsen's "Ghosts" was a most depressing book. People had written to him after reading such books asking, "Is it all inevitable, as the book represents?" He had received a letter from an anxious wife and mother, in a state of extreme depression, due to reading "Ghosts." He himself had just read a book entitled "Carnival," by Compton Mackenzie, which made a great sensation in London on its publication, and received most appreciative notices from the Press. That book devoted a whole chapter to a most misleading account of maternity, picturing it as a condition of misery for nine months, culminating in supreme agony. Those present would know that nothing more preposterous could be penned. Most women would agree that normal pregnancy was one of the most uplifting times of their lives. Instead of a state of misery it should be a state of exaltation. Of course, he agreed with Dr. Roth that menstruation was an absolutely normal process, and " monthly illness " a misnomer. Unfortunately, there had been a tendency in recent years to represent it as pathological. Through neglect it might become so, but, properly speaking, it was no more pathological than eating or drinking. What he had wished to convey in his lecture with regard to acquired characteristics was what he took to be the absolutely scientific view—that acquired characteristics, such as the enlargement of one's biceps, could not be handed on as such. But it was possible to hand on a condition of fitness—a tendency to ascending and progressive evolution, or, on the other hand, a general tendency to retrogressive evolution (devolution) and extinction. These were " acquired characteristics " in reality, though they were not so in the narrower sense, and the whole misunderstanding—the whole puzzleheadedness—arose from this absurd misconception. When he was lately in London he and his wife were working for a couple of months with some nurses in the slums of Bethnal Green, investigating the conditions which prevailed there. They had over fifty babies weighed regularly before and after suckling, &c. What struck every one of their party of investigators was the fitness of the slum children at birth. It was agreed by those who worked amongst such children that they were all right if they were properly looked after—that they showed no striking primary degeneracy. The same thing was proved by experience at the Karitane Baby Hospital and the experience of the Plunket nurses. Even children born in asylums were mostly all right, though, of course, he strongly deprecated procreation of the unfit. As to the evils of indigestion spoken of by Mr. Holman, some years ago Sir William Broadbent stated that he never came across a case of insomnia that was not associated with indigestion. The idea which had come about that reproduction was to be regarded as anything approaching the pathological was utterly absurd. Women should have their misgivings on this point absolutely obliterated, and should know that the exercise of this function was attended by the highest forms of human happiness. One sympathized absolutely with the words of ex-President Roosevelt when he said, " I feel towards the person who is not a parent as I feel towards the young man who has gone into war and has fallen in his first battle. He has not seen the best of it." He wished to say that he was entirely in sympathy with the school-teachers. When the recent Education Commission was sitting he received communications from all directions with regard to disabilities which he had often tried to get rectified. One of the most forcible letters came from the mistress of a very large infant school, asking him to put forward the things that she felt were utterly wrong in connection with the education system. That letter, which would be found in the report of the Commission, called attention to the evil effects of requiring little children to be prepared for three or four examinations in the year, with the result that in their sleep they talked about their lessons, and their nervous systems were thoroughly upset. As to the teachers themselves, he was bound to be in sympathy with them, seeing that, unfortunately, he had to deal with so many of them in connection with his own speciality. Next to the wrong that was being done to the school-children came the wrong done to the teachers under the misdirected and high-pressure system. The remarks of

Mr. George were extremely interesting, and were entirely in accord with what had been communicated by other teachers. There was no question that "homemaking" was a most important matter, and Otago people were proud to feel that their University had established the first Professorship in Domestic Science. The only anxiety he had in that matter was lest there might be a danger of loading a girl student up with too much mental detail and theory and too little practice. Like other speakers, he must deplore the sacrificing of girls in order that they might become typists, &c. A leading authority in Vienna, discussing this subject with him, had said of the typists, "I am sorry for them. They are earning a living now, but what will they be ten years hence?" One could only pity them, and be sorry that they were drifting into channels of life where they would lose the privileges and blessings of home life. So it would be seen the question was world-wide. As to the education of women, he would say, give woman the highest and best education, but let it be a harmonious, all-round education which would lead to her permanent fitness and happiness, and give scope to her altruism, which so much exceeded that of men.

GARDEN CITIES, TOWN-PLANNING, AND PUBLIC RECREATION CENTRES.

By Dr. J. W. Barrett, C.M.G.

I propose this evening to place before you a simple statement of the principles of the great movement alluded to in the above heading. I do not propose to indulge in any imaginative sketch of future social conditions, or to recommend remarkable innovations; but I do propose to draw your attention to a world-wide movement which is making itself felt in every civilized country on the globe. The recital of fact and the illustrations will convey to you the greatness and the vastness of the change which has taken place in the minds of members of the civilized races. The reasons for the change will become obvious as the evening passes by.

Up to a comparatively recent period, probably not much more than a century since, garden cities, town-planning, and public recreation centres were practically unheard-of. They were unheard-of for several reasons. The beliefs of the economists which were shared by the educated population did not stimulate change, and the paucity of medical knowledge and ignorance of hygiene barred stimulus from the standpoint of medicine. In addition, there was no obvious necessity for the movement. In Great Britain, for example, at the early part of the nineteenth century, the bulk of the population were engaged in agricultural pursuits. If the people so occupied were not very intelligent and not highly educated, at all events they possessed the bone and the muscle and the joy of work which are usually associated with healthy outdoor occupations. The change effected is due largely to the opening-up of the lands of the new world in North America, South America, and the South Pacific. In Australia and New Zealand, for example, the settlers, dealing with virgin soil, speedily found that they could produce much more raw material than they had need of, and that they required various articles they could not conveniently produce.

They accordingly began to export to the Old Country commodities which would stand the voyage—wool in the first instance, grain, and later on, when the freezing process was developed, meat, butter, and fruit. These exports, however, had to be paid for in imports, and thus development of agricultural land in the New World had two effects—it depressed agriculture in the Old World, and it stimulated manufacture. In fact, it was one of the causes of the rise of the factory system. With the advent of the factory system factories were erected, in which, with the use of iron, coal, and traditional skill, England rapidly dominated the world. The factories were put up in the first instance without any particular regard to sanitation, and the worker for his own convenience lived as close to the factory as possible. His own dwelling was put up without much regard for sanitary convenience, and before long the world was astonished to find that a new system was in operation. The *laissez-faire* statesman of the day, looking on, said, " Our people are doing that which they are best fitted to do ; the people overseas are doing that which best suits them ; exchange is going on freely—and the world is the better for it." And so the world was, provided the strictly commercial view of the matter was taken.

The result of this change was that men became aggregated in masses such as the world had not only never seen before, but never dreamt of before. Rome at her greatest in all probability did not contain within the walls of Aurelian more than 750,000 people—the population of Sydney to-day, although the population of Sydney is spread over a much greater area. But London contains ten Sydneys, New York contains six Sydneys, Chicago contains three to four Sydneys, and Philadelphia the same—not to speak of the masses in Paris and Berlin. Thoughtful people, however, began to notice that we had replaced the agricultural labourer, with his muscle, bone, and outdoor outlook, by a factory hand whose life was spent between a factory, too often insanitary, and a dwelling not much better ; and that his life consisted of his work in the factory, of a residence in a back street or lane, and an occasional visit to a park on Sunday. And the same people began to ask themselves whether the factory hand, with all his skill, was quite such a fine man as his agricultural forefather. It became obvious, too, that children brought up in these conditions do not develop as they should. In other words, the conviction was slowly formed from many lines of evidence that the factory system was making for physical and moral and intellectual degradation. As soon as a sufficient number of people become impressed with this view attempts at rectification begin—attempts to secure the advantages and eliminate the disadvantages of the factory system.

The factory system has come to stay. It is essential, and the world is on the whole richer with it, but if it can be shorn of its disadvantages the world will be richer still.

The history of the factory system illustrates the wise observation of Huxley that " when people pioneer a new movement it is quite certain that they will not reach the goal for which they are aiming, but they will never return to the point from which they started." Groping for means of rectifying the disadvantages came curtailment of the hours of labour for children, sanitary inspection of factories, and many other devices, and finally the conception that if the housing of the worker was good, if he were provided with amenities of life—means of outdoor and social recreation—much might be done. In other words, there came the recognition that people should spend a complete life, and not a life the sole object of which was the earning of a wage. And from that conception grew what is now known as the garden city, town-planning, and housing-reform movement.

What, then, is the garden city, and where are garden cities to be found? The idea seems to have originated in Great Britain, to have been immediately applied in some form more rapidly in Germany as a municipal and State undertaking, but to have gained great impetus in Great Britain under the aegis of copartnership and co-operative concerns.

There is only one garden city in England, but there are a very large number of garden suburbs completed, in course of construction, or projected. The garden city of Letchworth illustrates the necessary features.

If we examine the plan of Letchworth, the outstanding feature is that it is surrounded by belts of agricultural land. This land is let in small holdings, and on it farm-produce required by the city is grown. The agricultural land can never be alienated and used for any other purpose. It remains as one of the permanent features of the city, technically known as one of the amenities. Now, infantile mortality is largely produced by the consumption of decomposing milk, and in all cities of the civilized globe strenuous efforts are being made to improve the milk-supply. But when milk is brought—as in New York, I believe—sometimes a distance of four hundred miles from farm to city, it is clear that all the ingenuity of science is needed to prevent deterioration when it is produced, when it is in transit, and when it is delivered. In the garden city, however, the cow is within a few hundred yards of the mother, and the conditions of production can be ascertained by any one who takes a walk; the distances are small, and consequently deterioration in transit is practically out of the question. It will not surprise people to learn, therefore, that in Letchworth the infantile mortality is the lowest on record. The city is further provided with playing-fields. The factories are placed at the lower corner of the city, and are simple, pleasantly constructed buildings, with a playing-field attached. In the centre of the city is a public square, around which are grouped the principal buildings. In what, then, apart from the agricultural belt, does Letchworth differ from any other city? Its area is 4,600 acres; but what are the essential features? It represents an attempt to provide useful and healthy and beautiful buildings at rentals or cost less than those that would be paid for corresponding buildings which are not so useful or beautiful or healthy. There is no difficulty whatever in erecting a garden suburb if money is unlimited—for example, the magnificent garden suburb of Forest Hill, Long Island, New York. But the problem before those who constructed the garden cities is not how to spend money, but how to avoid spending it. By what means, then, have they succeeded? In the first place, the city is planned before it is built, and the position of the dwellings can be determined in relationship to water-mains, gas-mains, sewers, and the like; consequently the costs of connections can be reduced. Then, if it is built by one architect or board of architects, or one group of contractors, by the adoption of some unity of design and standardization of parts, considerable savings can be effected.

Great savings are effected in the construction of roads. Nothing is more remarkable in Australia than the excessive width of roads. This is due to the retaining of stock-roads, which were usually 3 chains wide. The habit of constructing wide roads has continued, and consequently enormous sums have been wasted in metalling and repairing roads which carry little or no traffic. As macadamized roads cost in Melbourne nearly 3s. a yard, as tarred roads cost 4s. a yard, and as wood blocks cost 16s. a yard, it can be seen that an unnecessarily wide road adds greatly to the expense of a city, and loads up the properties in it. The roads are usually classified—wide and heavily prepared, secondary roads, and residential roads. The residential road may be anything from 60 ft. from boundary to boundary, but the actual metal portion of the road is only 16 ft., quite sufficient for the purpose. Adjoining the boundary on each side is a small pathway within an avenue of trees, then the road proper. By this method of constructing roads, and by care in the design of roads, savings of enormous sums of money can be effected. There is yet another economy—the fences. There is no other country in the world with which I am acquainted in which the passion for fencing is developed as in Australia. It is also a residual habit due to the presence of stock, and I shall show you during the evening a house provided with a fence 6 in. from the house. The fence was not wanted, but the habit of putting up a fence made the owner feel that it would not be a proper house without a fence. Enormous sums of money have been wasted in the Australian cities on unnecessary boundaries. When, however, a garden city or a garden suburb is created, what is to prevent the owner from cutting up his piece of ground and putting two dwellings where one existed before, and consequently creating slums? There are three legal devices by which this is prevented. In the first place, Port Sunlight and Bournville represent proprietary garden suburbs erected by the public spirit of their owners, who have established trusts to conserve their features in perpetuity. The favoured method in England, however, is by a copartnership association, whereby the land, though really freehold, is held technically in perpetual leasehold so that a breach of covenant could end in forfeiture. Thirdly, in Germany the municipality has in Ulm replaced the copartnership society and established covenants which would end in forfeiture if the conditions were disregarded, and so it comes about that when Letchworth City is full, and contains thirty thousand people, no more people can enter, and a new Letchworth will have to be built on the other side of the agricultural belt.

If London had been developed on garden-city lines it would occupy an enormous area, but it would contain no slums, its death-rate would be very much smaller, and its inhabitants would be very much happier.

In Germany Krupps have established garden suburbs at Essen analogous to those established at Port Sunlight and Bournville, but the most interesting and remarkable development in Germany has occurred at Ulm, in Bavaria. The municipality repurchased land, and sells it to workpeople, either building dwellings for them or allowing them to build the dwellings themselves. But the municipality reserves the right to resume if covenants are broken, and in this way future crowding and slum-development is prevented.

From the foregoing it will be quite obvious that some new principles have entered into civic construction. It has been found necessary, in the interests of health and of reasonable enjoyment of life, to place some limitations on the right of individuals to crowd indefinitely. In England, in this as in other matters, the attempt has been rather to get people to undertake the business for themselves than to do it for them. In Germany the tendency is to use an enlightened bureaucracy for the purpose. It is further obvious that people who become proprietors or occupiers of a garden city or garden suburb feel that they are entering into a community of free persons who are not only concerned with the excellence of their own dwelling, but with the welfare and character of the people who are living around them. A social instinct of a high order is being developed. It is quite evident, however, that the changes which have been sketched can never take place under the existing by-law method of development. The citizens in their corporate capacity must control the development of their city. I was able to show the Mayor of Portland, in Victoria, a beautiful seaside town of three thousand inhabitants, that he had all the material ready for the creation of slums of a gross character in so small, so beautiful, and so remote a town; and, what was more to the point, that the slums must occur under the existing mode of control.

In America fences are practically unknown, and the illustration of Gary, Indiania, will show the beauty of a town laid out without fencing. Australians tell me that if there were no fences there would be no privacy, and they would not enjoy their homes. I am sorry to hear of it, because of the 1,600-odd millions of persons who live on the face of the globe only the five millions who live in Australia seem to be passionately addicted to the fencing problem. The remainder seem, in the main, to do without it. Raymond Unwin, one of the most distinguished of the garden-city architects, shows by the illustration that even from the standpoint of the speculator there is usually nothing gained by overcrowding. He does not say that in some special conditions overcrowding may not pay, but he does say that in most conditions overcrowding does not pay.

Now, in England the trouble is to build a house at a price which will enable the agricultural labourer, earning, say, 15s. a week, to live decently and pay an economic rent, and an acute competition has taken place between architects to produce such a dwelling. The lowest rental at Letchworth was 4s. 6d. a week. In garden suburbs the rentals are as low as 3s. a week. Mr. Rowntree erected a typical concrete cottage for £90, and there appeared in the *Times* recently an account of an experimental cottage of five rooms built for £110, on a quarter-acre of ground, and which could be let at 2s. 6d. and pay 10 per cent. interest on cost of construction. Now, such dwellings are not palaces, but they are decent, sanitary dwellings, and immeasurably superior to anything that could be obtained at such a price by the ordinary methods.

But there is another phase of the housing problem to which attention must be drawn. Australia possesses a tropical north. It is necessary that the tropical north should be peopled with white people, and the question has arisen, can it be done? A fallacy underlies the argument, because the bulk of Australia is not tropical. It is true that a considerable portion of it lies within the Tropic of Capricorn, but its exceeding dryness has been notorious.

Now, Haldane in 1907 taught us that temperatures measured by the dry bulb is quite a fallacious method of indicating the effect of heat on human beings; that the estimation of the humidity is also fallacious; but that the ratio of dry-bulb temperature to humidity as expressed by the wet-bulb temperature is a sure method of indication. He showed that at a wet-bulb temperature of 90 work must cease or heat-apoplexy intervene; that over 78 very little work could be done. These figures varied a little according to the amount of clothing and the amount of breeze, but they roughly express the position. He also showed that it did not matter whether the wet-bulb 90 was produced by dry-bulb 90 and saturation or by a dry bulb of 130 and dry air. It follows that in ascertaining whether a climate is suitable for white people, or in fact any people, to work in, the first requisite of knowledge is that of the wet-bulb temperature. Professor Osborne and the writer asked Mr. Hunt, the Commonwealth Meteorologist of Australia, to prepare wet-bulb isotherms of Australia illustrating the facts. This Mr. Hunt did, and the facts are most interesting. In midsummer a small strip of Australia in the north-west is above 80, but the bulk of Australia is below 75. In midwinter the whole of Australia is below 70. This explains why deaths from sunstroke are not common in Australia—not nearly so common as in the United States, and not much more common than in England—and it explains the robust appearance of the bulk of the Queensland men. But it does not explain the anaemic and neurasthenic appearance of too many of the Queensland women. In order to ascertain the cause of their appearance I have had prepared for me some photographs showing the houses in which they live. It is interesting to note that, while Australian working-men and others have been very keen to see that factories should be properly constructed, they never seem to have troubled much about the factories in which the women do their work—namely, their kitchens. Mr. Hunt has very kindly taken the wet-bulb temperatures in the kitchens at Port Darwin, Thursday Island, and Townsville, and compared the temperatures with those taken outside. So far as they can they show that at Port Darwin and Townsville, in what are supposed to be good kitchens, the wet-bulb temperature is very much higher indoors than out. With the lesson of Panama before us there is no reason why this should be so. But the photographs that I now show you will illustrate the miserable conditions under which too many women in Queensland work. You will therefore at once understand how profoundly the colonization of a country may depend on the scientific ability shown in house-construction. The Queensland houses are only built with the defects referred to because there was no scientific guidance in the matter, and we again reach the conclusion that some supervision for housing-development becomes a necessity.

Many people, however, have said to me, "What you say about defective housing may be true of the Old World, but is not true of this young and open country." By way of answer let me show a number of pictures taken from the Report of the Royal Commission in New South Wales on the Housing of Workmen in Europe and America, and some photographs of houses in Melbourne and suburbs, and I think you will agree with me that the conditions in Sydney and Melbourne are not at all creditable. It is true that I could obtain photographs of slums in the Old World which are worse than anything we can find. But we do not desire to wait until we have reproduced all these evils before we take action. Nothing is so clear in history as the fact that postponement of reform owing to lack of imagination causes the extortion of a fearful price later on.

The Bene Stabili in Rome represents the Italian method of dealing with the problem. The building of the Bene Stabili which I saw on the right bank of the Tiber was a large rectangular building containing a huge courtyard. The building was occupied by flats of two to six rooms, inhabited by workpeople, and the large courtyard, which was a garden, was the common place of resort for all the tenants. In the centre of this courtyard, however, was a four- or five-storied building containing lavatories, baths, sewing-machines, conveniences for laundry, and a surgery for a doctor and nurse. It further contained a Montessiori kindergarten, in which about forty little Romans were enjoying themselves. The whole of these conveniences are available to the tenants in consideration of the fact that they are tenants. The average price of the rooms is very low, and accommodation is provided in this way at a much lower rental than could be obtained elsewhere. But the Bene Stabili is not a philanthropic concern ; it is a public company which pays a 7-per-cent. dividend. The success of the Bene Stabili so far as workmen's dwellings are concerned is due to the Latin genius for economizing space.

If we now cross the Atlantic and ask what America is doing in this direction, we shall find that the American activities have taken a highly original development. When New York, Chicago, and Philadelphia found that they were becoming enormous cities, with parks, but few open spaces, they set themselves to work to find what could be done to provide for the development of those qualities which are usually regarded as necessary to good citizenship ; and they evolved a system of their own, now known universally as "the American playground system." It is so remarkable, so useful, and so instructive that I propose to deal with it at some little length. The first Chicago playground with equipment of modern type only dates from 1894—twenty years ago—and yet many millions have been spent since then on this form of development. A typical American recreation centre consists of 3 or 4 acres of ground divided into four compartments—one for little children under ten, usually provided with a sand-heap and wading-pool and a bench for the mothers ; one for girls over ten, with proper equipment ; one for boys over ten, with suitable gymnastic equipment ; and a play-field for adult men. The main building includes a social hall and men's and women's baths, a gymnasium, game-rooms for children, and children's libraries. In this way indoor and outdoor occupation is provided both by night and day. Free dances are frequently given, and to my inquiry of an American educationist, "Why do you give free dances ?" came the reply, "Young people will dance somewhere ; why not let them dance where the conditions are supervised rather than in the saloon around the corner ?"

The essence, however, of an American playground which is free to all is that every portion of it is under supervision, and a Superintendent presides over the whole. Salaried people devote their lives to the superintendence of the ground and the games. In fact, there are now in the United States as many professional play-leaders as there are State-school teachers in the State of Victoria. A census taken of the children who come to these grounds shows that they travel from short distances, and that in the future it will be requisite to provide not so much larger grounds as numerous small ones. The grounds are provided sometimes by private benefaction, sometimes out of public loan, but they are always maintained at municipal expense. Over each of these grounds floats the Stars and Stripes, and the use made in the United States of the national flag caused me to think that we might do more with the Union Jack than we do at present. We might remind our children that the Union Jack floats over one-quarter of the population of the globe, and that while it floats one-quarter of the population will remain at peace, and if the members of this nation administer their forces wisely the chances of peace for the rest of the world are greatly increased.

The expenditure on these playgrounds in the United States is enormous. Last year—1912—the expenditure in the United States was £1,250,000 sterling, New York alone spending £200,000. More than five hundred cities of the United States are actively at work in providing or extending means of play. A very good instance is given of Cleveland, Ohio, which contains about the same population as Melbourne. It has thirty playgrounds—that is, properly equipped grounds—and employs seventy play teachers and supervisors, and spends £6,000 per annum in the upkeep and salaries. It now proposes to raise the sum of £200,000 to provide more.

The essential feature of the American playground is that unsupervised play is not permitted. Those curses of Australia, cricket and football, are not allowed to dominate the position to the exclusion of those who do not want to play. It is the business of the supervisor to see that each and every person is occupied, and to avoid our fashion of allowing thirty people to play while the rest look on. Some of the facts relating to the playground are worth quoting. In the report of the Playgrounds Association of Philadelphia for 1909 the following statement occurs: "By the side of the great institutions of society—a good church, a good school, a good home—we must now place a good playground. These four are the inalienable rights of childhood. Through these and through all of them can we best secure to society the type of citizen we vision as best. The safety, the sanity, the sanctity, and the progress of civilization are best conserved by the community which gives the largest measure of attention to these great agencies, by which the race moves steadily sunward. The Philadelphia Playgrounds Association from the beginning defined its functions to be the provision of play for all the children of Philadelphia through municipal support, and under competent and trained supervision. No other type of play is for a moment encouraged by the Association."

Frank D. Watson is quoted as saying, "It is during leisure rather than during work-time that character is formed. The basis of character is the will, and at no time does this function of the mind have so free a scope as during recreation. It is then that all restraint is moved, and we do as we will. Excellent effects of recreation on character are seen in children at play. Often for the first time they learn the meaning ot self-restraint; they learn the significance of co-operation and action in those games requiring team-work. At play the cheat is quickly discovered, and punished with ostracism by his fellows. Such object-lessons in fundamental morality are invaluable in the development of any child." Dr. Gulich says, "A fundamental condition for the development of a free people is that they shall in childhood learn to govern themselves. Self-government is to be learned as an experience rather than taught as a theory. Hence in a permanent democracy adequate playgrounds for all children are a necessity. When a municipality makes it illegal to play in the streets, it should provide places where play will not only be lawful but encouraged."

The expenditure of a hundred of the largest cities in the United States in 1908 was £400,000. The total playground expenditure of the same cities, including 1908, was £6,130,000. New York spent in 1908 £1,160,000 ; Chicago's thirty-two playgrounds in 1908 cost £60,000 foi maintenance.

From a survey of the foregoing it will be seen that the great civilized countries of the world are approaching the evils of crowding and city life by methods varying according to the temperament and character of the people. It will also be obvious that in each of these countries profound dissatisfaction exists with the old order, and sacrifices are being made to effect considerable change. We in Australia and New Zealand are in the fortunate position that there is still time to prevent the development of many of the evils which have taken place. Nevertheless, sufficient damage has been already done. The most practical way of dealing with the matter is, in my judgment, the adoption of a modification of the British Town-planning Act of 1908, which gives authority to municipalities to control the extension of cities, making proper provision for open spaces for playgrounds and for the housing of workpeople. The British Act is singularly fine in principle. Every effort is to be made to induce people in their corporate capacity to carry out the provisions of the Act, and only in the event of their obstinately refusing to behave as social individuals is compulsion to be exercised.

If, however, Australian cities are allowed to develop in the future as in the past, we shall have in this favoured land a reproduction of the evils of the Old World, and without the legitimate excuse that they did not realize what was occurring until the development occurred ;. whereas we are now acting with our eyes fully open.

In Glen and Dean's "Town-planning in Law and Practice" the following passage occurs: "It is said by some that the housing question is of more pressing importance than town-planning ; but in most cases town-planning should be resorted to, first, principally as a means of preventing the necessity for future costly housing schemes in areas at present undeveloped, and, secondly, as a method of preparing a way for the efficient housing of working classes in areas already developed. To place housing before town-planning has been aptly compared to sewing on your buttons before you cut out your garment."

May I point out that, apart altogether from economic necessities, the saving in human life, in human efficiency, and in human character that may be effected by the means indicated is so enormous as to justify a reasonably free expenditure at the present time.

In conclusion, may I urge on medical practitioners the desirability of grasping the principles involved in town-planning, which is to a large extent a problem of medicine; and if the forces of scientific medicine are brought to its aid it will probably be developed in a better and more sensible manner than if it is left entirely to develop under lay control.

REPORT OF THE SPECIAL COMMITTEE ON SYPHILIS, AND DISCUSSION THEREON.

At a general meeting of the Congress held in Melbourne, October, 1908, it was resolved that the Executive of each Congress be recommended to appoint a Committee to investigate, tabulate, and report the facts in regard to syphilis which such Committee may obtain. The Committee to report to the next meeting of Congress, and be given authority to publish its report prior to the meeting of Congress if its investigations should convince the members of the Committee of the necessity for such urgent action.

The mover proposed that this Committee should consist of men who would be interested in observing the various sociological measures that have been adopted or recommended in various countries, and would observe the effects such measures have had, so that they would be in a position to publish for the use of all Australasia, and also for the older world, the facts tabulated in a proper way, and all the most recent work in regard to syphilis.

It was also resolved, " That syphilis is responsible for an enormous amount of damage to mankind, and that preventive or remedial measures directed against it are worthy of the utmost consideration."

A discussion on syphilis that took place at that meeting was initiated by the President of the Congress, Professor Sir H. B. Allen, and was mainly on the clinical and social aspect of syphilis in Australia, each section of the Congress contributing its opinion as to the prevalence and methods of prevention of the disease. Some of the remarks of the speakers will be referred to later.

A Special Committee was set up to report on syphilis to the Congress in Sydney in 1911, and a combined sectional meeting of Congress was held to consider the report, and discuss the prevention of syphilis. In the report the subject was considered under two heads, viz.: (1) The prevalence of the disease; (2) measures which might be adopted to diminish such prevalence.

As regards the prevalence of the disease in Sydney, the metropolitan practitioners had been circularized, but practically without result, as the time allowed had been very short. Some hospitals sent in returns for six months. The fleet returns will be referred to subsequently.

As regards (2), measures that might be adopted to diminish the prevalence of syphilis,—

(1.) *State Regulation of Prostitution.*—This did not commend itself to the Committee, which, however, approved heartily of the Prisoners Detention Act, 1908, under which certain prisoners whom the Gaol Surgeon certifies to be suffering from venereal disease may be detained in a lock hospital until free from such disease, and the Police Offences Amendment Act, 1908, which (*inter alia*) imposes penalties on common prostitutes who solicit or importune for immoral purposes any person in any public street, thoroughfare, or place.

(2.) *Notification* was not recommended.

(3.) *Increase of Facilities for the Treatment of the Disease.*—The Committee considered that the disease should not be treated in special hospitals, but in special wards or departments of the general hospitals.

(4.) *The Prohibition of Entrance into the State of Syphilitics.*—This had been already provided for under the Commonwealth legislation, and the Committee heartily concurred and recommended rigid enforcement.

In the discussion on the prevention of syphilis a paper was read by Dr. Burnett Ham covering the State aspect and the history and prevention of the disease. This is a full and concise report, and easy of access, being printed in full in the Transactions. A subsequent paper by Dr. Lamble placed on a sure and scientific basis the fact of syphilis being a great underlying cause of infant mortality. Dr. Hiller's progress report on the investigation in syphilis, made in the metropolis of Melbourne, is of great importance.

The following resolutions were then passed by Congress :—

(1.) That, in the opinion of this Congress, a time will come when the compulsory notification of syphilis and gonorrhoea will be necessary, and the earnest attention of the Health Departments of the Australian States should be drawn to the matter, with the object of introducing such notification when the time is ripe. That the Congress expresses its sense of the importance of having such work done.

(2.) That it should be a legal offence for any person who is not a legally qualified medical practitioner to treat a case of venereal disease.

(3.) That each State Government be invited to provide increased facilities for the treatment of cases of venereal disease.

(4.) That general hospitals and dispensaries, rather than public or lock hospitals, should provide the necessary accommodation for venereal cases.

(5.) That it be a legal offence for any person cognizant of the fact that he or she is suffering from a venereal disease to communicate such disease.

THE WORK OF THE SPECIAL COMMITTEE TO REPORT ON SYPHILIS TO THE CONGRESS, 1914.

THE Executive of the Congress to be held at Auckland in 1914 appointed a Special Committee in accordance with the Standing Orders. The Committee consists of—Chairman, Dr. W. E. Collins, Wellington ; Professor L. E. Barnett and Professor D. Colquhoun (Secretary for Otago) ; Dr. W. J. Barclay, Invercargill ; Dr. G. E. Gabites, Timaru ; Dr. H. T. D. Acland, Christchurch ; Dr. S. A. Gibbs, Nelson ; Dr. W. McKay, Westland ; Dr. E. E. Porritt, Wanganui ; Dr. H. D. Robertson, Taranaki ; Dr. J. W. Williams, Gisborne ; Dr. E. A. W. Henley, Napier ; Dr. J. Hardie Neil (General Secretary), Auckland ; South Sea Islands—Hon. G. W. A. Lynch, Chief Medical Officer, Suva, Fiji.

The Committee met in Wanganui in February, 1913, and determined to circularize every practitioner in New Zealand, and also institutions such as mental hospitals, gaols, general hospitals, old men's homes, and Salvation Army homes. This has been done.

The Committee determined to obtain information as to the prevalence of syphilis in New Zealand, the South Sea Islands, and as to the outside source of infection:

Replies to the General Circular issued by the Committee to all Practitioners in the Dominion.

Questions (1) to (3) refer to Nature of Practice and Population of Locality.	Replies to Questions in Circular.															
	No. 4. Is Syphilis Common in your District?			No. 5. Is it More or Less Common than in Years past?				No. 6. Are the Individual Cases of a More Severe or of a Milder Type than in Past Years?				No. 7. Have you any Knowledge of Sources of Infection from Outside Areas?		No. 8. Could you give Information as to the Number of Cases of Primary and Secondary Syphilis met with in your Practice in the Last Two Years?		
Place.	Yes.	No.	No Information.	More.	Less.	No Alteration.	No Answer.	Milder.	More Severe.	No Change.	No Answer.	Locality.	Number.	Primary.	Secondary.	No Cases.
Auckland City (54 replies)	4	30	20	2	10	22	22	9	2	18	6	Sydney, 1; shipping, 4; Australia, 2; Islands, 4; India, 1	23	514	101	10
Auckland district (46 replies)	..	45	1	..	11	35	..	4	..	9	33	Fiji, 1; Auckland, 6; Sydney, 1; South Africa, 1	39	54	84	21
Wellington City and district (46 replies)	3	41	2	2	18	14	11	17	..	12	16	..	25	380	55	3
Taranaki and district (8 replies)	..	7	1	2	1	1	4	..	..	2	5	Auckland; Wellington; travelling prostitutes	4	21	18	..
Wanganui and district (22 replies)	..	20	2	..	2	20	..	5	..	4	13	America; South Africa, 1; shipping, 1; Wellington	17	36	17	9
Napier and district and Gisborne (6 replies)	..	8	..	..	3	3	..	2	..	2	6	..	10	9	12	6
Nelson and district (7 replies)	..	7	..	..	4	3	..	2	..	1	4	Melbourne; Islands	5	14	1	3
West coast of South Island (7 replies)	..	7	..	..	1	4	2	..	..	..	7	Wellington; Auckland	4	2	12	1
Christchurch and district (62 replies)	4	56	2	3	15	20	24	11	1	16	32	Glasgow, 1; Scotland, 1; local prostitutes, 3; Australia, many; Fiji, seamen from various ports, commercial travellers	47	234	84	12
South Canterbury (12 replies)	..	14	..	..	4	8	..	1	1	5	5	Shipping	11	12	**48**	7
Dunedin City and district (17 replies)	..	16	1	1	1	15	..	3	1	6	8	Australia; shipping, 3; South Africa; London; Auckland	12	14	**15**	7
Invercargill and district (10 replies)	..	10	..	..	5	3	2	2	..	2	6	..	10	7	1	6
Gisborne (4 replies)	..	4	..	..	4	..	4	..	..	..	4	..	..	1	..	3

Total replies from 301 private practitioners show	1,288 (primary) 443 (secondary)
General hospitals	192
Mental hospitals	18
Total fresh infections during last two years	1,941

With this end in view, the Hon. G. W. A. Lynch was asked to take charge of an investigation covering the prevalence of syphilis in the Fiji Group, of which he is the Principal Medical Officer ; Dr. G. Pearce Baldwin was asked to report upon the Cook Islands, and Dr. Arnold Izard upon Tonga. The Committee has had to rely upon general information as regards the Islands of Tahiti and Samoa.

An investigation covering Australia would be much better conducted by a Committee working from one of the cities in the Commonwealth. This Committee has therefore decided to limit its investigations to the condition of affairs in the Dominion and South Sea Islands. As the disease is of such immense importance to humanity, the subject will no doubt be further considered at the next Congress.

With regard to the prevalence of syphilis in New Zealand, the Committee has received replies from 301 medical practitioners in practice in the Dominion, and certainly from all men in prominent active practice.

It is obvious that, of the cases reported, more than half come from Auckland and Wellington, which cities have the most frequent communications with outside countries.

The returns report 1,941 primary and secondary cases that were seen by private practitioners during the last two years. To these must be added cases met with in institutions. Auckland contributes 615 from the city and 138 from the outside districts ; Wellington, 412 in the city and 23 from the outside districts ; Christchurch, 252 from the city and 24 from the outside districts ; Dunedin, 44 from the city and 14 from the outside districts. Therefore the cities report 1,323 cases, the country 265, for the whole of New Zealand ; Wellington and Auckland Cities between them contributed 1,196 cases. To these must be added the hospital returns.

Tabulated replies to the general circular issued by the Committee to all practitioners in the Dominion appear on the previous page. They have been collected in each province by the member of the Committee representing it.

The Territorials.

These are recruited from youths of the ages from eighteen to twenty-five, whilst the cadets are for those of fourteen to eighteen years. They are representative of all classes in the community.

Five cases of acquired syphilis were treated in Wellington, but none in the other centres. The Principal Medical Officers report a small proportion of those examined as being undoubtedly the subjects of congenital syphilis.

Institutions.

Of the various institutions which have sent in returns, thirteen general hospitals report 192 cases. Here it is to be noted that most of them, by their regulations, refuse admission and treatment to primary venereal cases. Even at this stage one must remark on the extraordinary lack of foresight in this regulation. This certainly is a most unfortunate position, and the Committee considers that hospitals ought to take in and treat any person suffering from this disease, who is a danger to the community.

The returns from the hospitals correspond fairly closely to those submitted by general practitioners in the same cities.

The St. Helens Homes have no definite returns, but the Dunedin Maternity Home reports thus, and it is typical of the others: "As St. Helens Hospital is a maternity hospital, we do not treat syphilis *per se.* We have had children born with all the manifestations of congenital syphilis, and with many of the still-births mothers have shown suspicious symptoms (inquiries have not been made from fathers)."

Reports from the Salvation Army maternity homes vary. The Salvation Army Maternity Home in Dunedin reports that there have been a few suspicious cases, but none they could be really certain about. In Auckland there were three noted and others were doubtful. Three children died from syphilitic marasmus, and the officer in charge thinks that the disease must be prevalent amongst a certain class in the city.

In Wellington six cases have been reported, and seven children showed signs of the disease. Three of the latter died. These women had undoubted signs of syphilis. Also it is a well-known fact that women give birth to syphilitic children of infected fathers without showing any obvious signs of disease on their own part. It is clear, therefore, that these figures indicate a heavy infection amongst this class.

The old people's homes average about two each of syphilitic derelicts.

Speaking of institutions, during 1911 and 1912 there were 149 children committed to the Christchurch Receiving Home, and six have had syphilitic manifestations. To the Te Oranga Reformatory for girls forty-three were committed during the last two years, two with syphilis.

In the Burnham Industrial School the Medical Officer has noted numerous cases of the effects of congenital syphilis.

In the Salvation Army Rescue Home at Christchurch two cases were noted during the last two years. Three were noted in Auckland, and three were reported doubtful.

In the Inebriates' Home at Pakatoa Island two cases were recognized by the officer in charge.

As a commentary on this, it is almost unnecessary to point out that syphilis tends to conceal itself in women—that is, the obvious manifestations of the disease more quickly disappear in them than in men.

Mental Hospitals.

Replies have been received to circulars sent to Avondale (Auckland), Porirua (Wellington), Nelson, Hokitika, and Seacliff (Dunedin). The Seacliff returns (apart from general paralysis) are incomplete.

Eighteen cases of syphilis were noted amongst the members of the staff or patients who were not thus influenced mentally.

Five cases of insanity arose from parental syphilitic infection.

The percentage of idiocy that is due to syphilis is now by the blood-test found to be higher than was formerly thought. Early mental defectives and early epileptics give a positive Wassermann's reaction in about 45 per cent. of cases. The obvious signs or stigmata are present in only a fraction of the victims of congenital syphilis.

Twenty-two cases of idiocy and imbecility are attributed to parental infection.

Two hundred cases of general paralysis have been treated in New Zealand mental hospitals over a period of ten years, and the opinion of the Medical Superintendents as regards the causation of this condition has been anticipated by Noguchi's discovery, demonstrating that all general paralytics are syphilitic.

The period between infection and the committal in the patients varies from ten to thirty years. The source of origin of the infection is difficult to locate, although it is interesting to note that seven of these cases came from Nelson Street, Auckland.

It is obvious that if the returns are correct the majority of general paralytic are not treated in the principal mental hospitals of the Dominion, as the following most important letter will show :—

> SIR,—I am directed by the Minister of Public Health to forward you the following figures showing the deaths in New Zealand resulting from general paralysis of the insane during the last ten years for which the figures are available. The figures are,—

1905	46	1910	49
1906	55	1911	51
1907	45	1912	39
1908	43	1913	40
1909	36	1914	47

I have, &c.,
MALCOLM FRASER,
Government Statistician.

The totals show that 451 persons died in New Zealand during the last ten years from general paralysis of the insane. Fournier's statistics show that 3 per cent. of all syphilitics develop that form of the disease. Therefore, by multiplying the average of ten years by 33, one can estimate the annual infection of the Dominion at about 1,500. A man may conceal the earlier forms of syphilis, and, though dying from the effects of the disease, be certified as having succumbed to one or other of the general causes of death. If, however, a man becomes the subject of general paralysis of the insane he is, as it were, thrust out into the open, for the nature of the case and the habits of the patient make confusion or concealment practically impossible. Allowing, therefore, for several vitiating factors, we suggest that the death-rate from general paralysis of the insane is one of the best of the available indicators as to the extent of the syphilitic infection of a community. As the length of life of a syphilitic after developing symptoms of general paralysis of the insane is two to three years, it follows that about a hundred of these are being maintained in this community. The statement of mental experts that syphilis (acquired or inherited) is the cause of at least 25 per cent. of all mental diseases demands attention in view of the universal increase in the cost of mental hospitals.

The Gaols.

The five main gaols receive from other districts. The Invercargill Gaol is under the observation of a member of our Committee. He considers that the disease is very rare, and has seen no primary or secondary cases during the last two years. In Dunedin twelve cases have been seen. The Surgeon in Charge thinks that syphilis in various forms is seen in a good many cases in the institution. In Lyttelton Gaol a great many prisoners have had the disease, though none in the last two years showed primary signs. Still, the Medical Officer thinks a very large percentage of the prisoners have been infected. The return from Wellington Gaol shows that syphilis is common in that institution. In Auckland the Medical Officer thinks that 1 per cent. of the patients show signs of syphilis, and most cases appear in those who have been seafaring at some time. Very few cases are attributed to infection in Auckland, and he is of opinion that syphilis should be notifiable.

General Commentary on the Returns.

In speaking of the returns as a whole, the number recorded in these returns cannot be taken as an indication of the absolute amount of syphilitic infection—so many cases do not come under the observation of medical men in the primary and secondary stages, when they are readily recognized. It is well known that cases which are tided over the early stages may show no obvious signs of the disease for years.

It is safe to say that if all the medical men in the Dominion had replied the amount of the disease reported would be at least double, and even then there would not be shown anything concerning the number of diseases which have their origin in syphilitic infection, nor the number of congenital cases of which it is impossible to get anything like approximate reports even from medical men, although many practitioners proffer the information that they see them frequently.

The replies to the question as to the frequency of syphilitic infection as compared with former years are indefinite, but, if anything, the evidence points to the fact of it being less frequent. The same remarks apply to the inquiry as to the severity, the evidence again being in favour of its being milder, though the majority report that they are unable to see that there is any change.

The medical practitioners doing eye-work are very insistent on the prevalence of tertiary and congenital syphilis, especially the congenital form. Recent work on the blood-test shows that women who bear syphilitic offspring are themselves the subjects of a latent yet personal infection. The detrimental influence on their health and vitality requires no elaboration.

Sources of Infection.—The replies are practically unanimous that the infection is sea-borne, Australia, especially Sydney, being most commonly mentioned, then the South Sea Islands, with a proportion of cases coming from other oversea routes. We must, then, ascertain from the information available the extent of the disease in the places mentioned.

With reference to Sydney, it must be recognized, in the first place, that a great source of syphilis in Oceania is undoubtedly the Indian coolie population of the islands. There is said to be a fair amount of communication between Sydney and the South Sea Islands by various trading-schooners, and direct communication from Melbourne and Sydney to the Fiji Group. Medical officers state that the East Indies, China, and Japan are also common channels of infection. Sydney has direct communication with these countries.

The statistics issued to the last Special Committee show that the patients of the Main Insane Hospital (Callan Park) showed 14 per cent. of positive Wassermann reactions. The Royal Prince Albert Hospital showed 118 primaries and secondaries and fifty-five tertiaries in six months. The Sydney Hospital showed 144 primaries and secondaries, and sixty-six tertiaries. The Coast Hospital returned eighty-nine primaries and secondaries, and twenty-two tertiaries.

The naval statistics show that 66 per cent. of venereal cases that occurred in 1910 were infected in Sydney, but it was mentioned that this bad pre-eminence was due to the fact that Sydney was the headquarters of the station, and, in consequence, more time was spent there.

The statistical report for the health of the Navy of the Australia Station, 1912, shows that ten primary, twenty-four secondary, and thirty chancroid cases were notified. The majority of the latter may be safely classed as syphilis. The mean force employed on the station was 2,540.

The statistics permit the Committee to say that they confirm the belief that as far as Sydney is concerned syphilis is a disease of considerable prevalence.

In his introductory address on syphilis, Professor Sir H. B. Allen, President of the Melbourne Congress, whose eminence as morbid anatomist is well recognized throughout Australasia, gave the analysis of 100 consecutive autopsies performed by him in 1904. He showed that thirty-four cases were clearly syphilitic and twenty doubtful. A subsequent analysis for the purpose of the address given showed thirty-two to be syphilitic and thirty more or less doubtful. He stated that his results could not be applied to the whole body of in-patients in the hospital, but they were of momentous significance. The marked prevalence of aneurism, causing eighty-eight deaths in men and women in one year, was noted by him as being strong collateral evidence. Much of his work has been corroborated subsequently by the Wassermann reaction.

The average infection of hospital patients of all classes seems to be about 14 per cent. In fact, the President of the Section for Diseases of Children reports that 10 per cent. of the total number of children in Melbourne are syphilized, and 14 per cent. of the adult population in the families that he attended were infected. This seems to be the average figure for mental and general hospitals and general practice.

In reference to other Australian centres, a report has been received from the sub-committee of South Australian Branch of British Science Guild, set up to inquire into the prevalence of the venereal disease in South Australia. One per cent. may represent the frequency for Adelaide environs, whilst post-mortem records show 8·9 per cent. The report will be published in the Transactions.

Coming now to the South Sea Islands, New Zealand has direct communication with the Fiji Group, the Cook Islands (Rarotonga, &c.), and Tahiti. The following report has been received from the Hon. Dr. Lynch :—

Sir,— Medical Department, Suva, 11th November, 1913.

I have been asked by your Secretary to give my studied opinion in regard to syphilis in these islands.

The consideration of the subject in Fiji divides itself naturally into the cases that occur, or may occur, in the various races that inhabit the colony.

Here we have—(1) Fijians ; (2) Indians ; (3) Polynesians ; (4) miscellaneous half-castes ; (5) Chinese and others ; (6) Europeans.

(1.) Dealing with these people in the above order, it may be said generally that syphilis does not occur among Fijians at all, and reference to the replies to queries will show that opinion to receive confirmation from all the medical officers who have replied.

After a residence in Fiji of over twenty-three years I may say that I have never seen a case of syphilis in a Fijian, and have only heard of one case, reported, I think, by G. Emerson Arnold, M.D., District Medical Officer, at the time, of Labasa.

All Government officers in Fiji are of opinion that the fact that 99 per cent. of Fijians have suffered from framboesia, or yaws, in childhood confers on them immunity from syphilis. It may be so, and in my opinion it is so ; but a fact of some importance must be considered, and that is that Fijians do not mix freely sexually with Indians. Hitherto, however, there has been no opportunity of putting the matter to practical test. I may quote a case of congenital syphilis in an infant born of a European father (whom I treated for syphilis) and a Fijian mother. The infant had a typical congenital disease—the mother was entirely unaffected in any way ; she had had framboesia in childhood.

As a result of framboesia we observe here some of the typical signs of later syphilis, including placental disease causing abortion and also general paralysis of the insane, which may be said to be fairly common among Fijians who have not had syphilis but have certainly had framboesia.

(2.) Indians: These suffer from syphilis in all its forms, and sometimes very gravely, more especially in neglected cases. Indians also suffer from framboesia. I have seen some cases in which I could not but think the two diseases were concurrent. It would be a matter of great interest to follow cases of infantile framboesia in Indians in order to discover if these also were immune to syphilitic infection, as we suppose framboesia to be, but so far it has not been possible to do so here.

There are fair numbers of secondary syphilis treated in the Colonial Hospital, Suva, but by far the greater number are seen in the districts away from the town, and on plantations, where, of course, the great majority of Indians live and work. Cases are frequently brought to the colony by the immigrant-ships, and these are detected on first arrival, and either repatriated or treated before distribution to plantations.

(3.) Polynesians and Melanesians are seen from time to time with true syphilis, and in them the local lesions are generally very severe.

(4.) Half-castes suffer from syphilis, but not to any great extent.

(5.) Chinese and miscellaneous do not come very much for treatment.

(6.) Europeans are seen from time to time, and generally, I think, the infection is from Indians.

There is practically no communication between these islands and Tahiti. An occasional warship goes there from here and returns, but irregularly.

The list below will show at a glance the number of cases of syphilis treated at the Colonial Hospital, Suva, from 1898, with a few gaps (I regret to say that I am not able to fill these gaps, the reports from which they have been taken having been mislaid).

The table also gives nationalities of persons treated, and from the year 1908 the figures are also given for the "provincial hospitals" and for the "plantation hospitals." I may perhaps explain that "provincial hospitals" are Government hospitals established in various parts of the colony for the treatment of Fijian Natives, and that emergency cases in other races are also admitted. "Plantation hospitals" are the hospitals of private-estate owners, looked after by Government Medical Officers, for the treatment of the labourers on the plantations, mainly indentured Indian coolies of both sexes. There are eleven provincial and nine plantation hospitals, or, rather, nine groups of the latter.

Hospital.	Year.	European.	Fijian.	Indian.	Polynesian.	Cases treated, Total.
Colonial Hospital, Suva ..	1896	1	..	8	..	9
,, ,, ..	1897	1	..	11	..	12
,, ,, ..	1898	..	..	16	3	19
,, ,, ..	1901	2	2	21	..	25
,, ,, ..	1902	2	..	26	..	28
,, ,, ..	1903	..	..	14	..	14
,, ,, ..	1904	Returns	missing.			
,, ,, ..	1905	..	..	34	..	34
,, ,, ..	1906	1	..	20	..	21
,, ,, ..	1907	3	..	25	..	28
,, ,, ..	1908	..	..	26	1	27
Provincial hospital ..	1908	..	..	2	..	2
Plantation hospital ..	1908	..	..	163	..	163
Colonial Hospital, Suva ..	1909	..	..	37	..	37
Provincial hospital ..	1909	..	..	2	..	2
Plantation hospital ..	1909	..	..	255	..	255
Colonial Hospital, Suva ..	1910	..	..	36	..	36
Provincial hospital ..	1910	..	..	2	..	2
Plantation hospital ..	1910	..	..	358	..	358
Colonial Hospital, Suva ..	1911	1	6	52	..	57
Provincial hospital ..	1911	..	..	1	..	1
Plantation hospital ..	1911	..	..	335	..	335
Colonial Hospital, Suva ..	1912	1	..	48	..	49
Provincial hospital ..	1912	..	..	6	..	6
Plantation hospital ..	1912	..	..	329	..	329

It will be noted that in 1901 two Fijians are entered as cases of syphilis in Fijians at the Colonial Hospital. These I find entered as "inherited," but I doubt if these are cases of syphilis at all.

In 1911 six cases are entered as syphilis in Fijians at the Colonial Hospital, but they are put down as very doubtful, and I do not believe that they were really cases of syphilis. The other cases entered at the Colonial Hospitals—in 1908, two cases; 1909, two cases; 1910, two cases; 1911, one case; 1912, six cases—are in every case noted as being non-Fijians.

I attach all the replies sent to me by the Government Medical Officers in reply to your circular.

I have, &c.,
G. W. Lynch,
Chief Medical Officer.

As regards the New Hebrides, the Committee has not been able to get any exact information, but has been informed by the medical officers of the Navy and others that syphilis is not a very common disease in those islands.

Dr. Arnold Izard, the Principal Medical Officer of Tonga, reports that yaws is very common, and he is of opinion that, although infection by this is common, inoculation is probably practised on children, as the infection is lighter in its effects in infancy. Syphilis is very rare, and the infection comes from other islands.

The question of the Cook Islands is a difficult one. Undoubtedly yaws is very prevalent in the islands, and the opinion of the medical men is that syphilis is also common. The heavy infant mortality is partly ascribed to it, and it is suggested that medical administration, after the manner of that instituted in the Panama Canal zone, will be necessary if the aboriginal population is to be preserved.

Coming to Tahiti, there is direct communication with Tahiti via Rarotonga. This is by alternate fortnightly services from Auckland and Wellington to Rarotonga and Tahiti. These ports are also touched at by the San Francisco service.

The opinion is uncontradicted that venereal infection is very rife in this and surrounding islands; also that opportunities for contracting infection of this class are very plentiful, and that in these particular localities full advantage seems to be taken of such afforded opportunities.

The opinion of officers on the boats is that there is a constant though varying stream of infection coming to the Dominion via the last-mentioned route, and that with the opening-up of more frequent communication between the various islands that has steadily taken place the infection will be spread, especially amongst those not infected with framboesia.

Recent Australasian Legislation.

A great advance has been made by the addition to the statutes in New South Wales of the Prisoners Detention Act, 1908, which has had a distinct effect in reducing the amount of specific disease among the class of people affected by the Act, and also among the sailors attached to the Naval Squadron when lying in Sydney Harbour.

In Queensland, the Public Health Act Consolidated, 1911, section 132A, is as follows: 132A (2) provides for notification of these diseases. 132A (3) reads, " No person other than a medical practitioner or a person acting under the direct instructions of a medical practitioner shall attend upon or treat any person suffering from such disease." The penalty is not exceeding £50, or six months. " This subsection shall not apply to a registered pharmaceutical chemist who dispenses to the prescription of a medical practitioner, or to any pharmaceutical chemist who under a permit in writing from the Commissioner (of Health) (which permit the

Commissioner is hereby empowered to grant) prescribes any medicine or drug for any person suffering from such disease, or to any person who under a permit in writing from the Commissioner (which, &c.) sells any proprietary medicine or drug to any person suffering from such disease: Provided always that the proprietary medicine or drug is approved of by the Commissioner."

In New Zealand there is no special legislation, and, except that in reference to the control of prostitution, there is no Act which affects this particular disease; but it is hoped that the important clause 19, introduced into the Hospitals and Charitable Institutions Amendment Act, 1913, No. 56, will be made use of for the purpose of checking this among other contagious diseases. It is as follows: "(1.) The Governor may from time to time, by Order in Council gazetted, make regulations for the reception into any institution under the principal Act of persons suffering from any contagious or infectious disease, and for the detention of such persons in such institution until they may be discharged without danger to the public health. (2.) Any person in respect of whom an order under this section is made may at any time while such order remains in force appeal therefrom to a Magistrate exercising jurisdiction to hear such appeal and to make such order in the matter as he thinks fit. An order of a Magistrate under this subsection shall be final and conclusive. (3.) Regulations under this section may be made to apply generally or to any specified institution or institutions."

Prevention.

It may be said of syphilis that ignorance is the measure of indifference. The medical profession, which is appalled by the effects of the disease on the individual and the race, has attempted to direct public attention to the question of its prevention. Recently it has been discovered that the organism known as the *Spirochaeta pallida*, which has been accepted as the cause of the disease, is only a phase in the cycle of existence of the infecting parasite. This offers a clue to the known resistance, especially of old-standing cases, to even the more powerful modern treatment, as the spore forms of this all-tissue-pervading organism become in the course of time deposited in the by-paths of the body, where they evade the newer medicaments that are so fatal to the accessible matured parasites.

Hence the medical profession cannot countenance the assumption that the recent advances in regard to the treatment of syphilis allow of any mitigation of the fear of syphilis which has to the informed acted in the past as a great deterrent. Personal and State prevention are urgently called for, as the blood-test shows the effects of the disease to be more devastating than was formerly thought, both in regard to the infected person and the progeny. With a more generalized knowledge of the nature of this disease its diminution must follow. It is the common experience of medical practitioners to find that the newly infected have been greatly ignorant of syphilis and its prevalence, and that the catastrophe of infection preceded the real knowledge of its significance.

At the seventeenth International Medical Congress, held in London in August, 1913, the following resolutions were carried, the second one unanimously: "That, sensible of the ravages wrought by syphilis on the health of the community, and deploring the inadequacy of existing facilities for checking its dissemination, the International Medical

Congress calls upon the Governments of all the countries here represented—(1) to institute a system of confidential notification of the disease to a sanitary authority, wherever such notification does not already obtain ; (2) to make systematic provision for the diagnosis of all cases of syphilis not otherwise provided for."

As the result of representations made to the Imperial authorities a Royal Commission was set up to obtain information and report on the question of venereal disease. This Commission is at present taking evidence from all official sources, and, in addition, is hearing the opinions of those qualified to deal with the subject. The Committee now framing this report for the Dominion of New Zealand is strongly of the opinion that in order to act in unison with the Royal Commission at present sitting in England it is eminently desirable that Royal Commissions should be set up to take evidence of a similar nature throughout New Zealand and Australia.

As regards the history of contagious-disease legislation in New Zealand, it may be recorded that the Contagious Diseases Act, on the lines of the English Act, was adopted by the New Zealand Parliament as a permissive measure. It was brought into operation in Auckland in 1883 by resolution of the City Council, which established a lock hospital where registered prostitutes were medically examined every month, and were granted certificates if free from disease. Christchurch had previously adopted the Act. There was continuous public agitation in both cities against it, and, after being in operation for several years, the lock hospitals were closed. The campaign against the Act was maintained chiefly by women, and when female suffrage became law the pressure exercised from that quarter secured the repeal of the statute.

The Committee take it for granted that the profession and public generally deem police regulation of prostitution inadequate, inadvisable, and useless.

In New Zealand the women known as prostitutes are repressed by the police to such an extent that they are becoming rare. However, clandestine immorality, by far the greater source of infection, holds its usual sway, and seems to increase in amount the nearer the locality to the Equator.

Reference may be made in passing to the prevailing impression amongst the laity that, as syphilis is a loathsome disease, it is found only among abandoned persons. As of old, however, the medical profession knows that immorality clothed with a semblance of respectability is the greater source.

The medical profession is concerned as a profession with the prevention of venereal disease, and cannot associate itself with the penalizing of certain members of a sex which contains the minority of infected individuals, and who certainly are not the greatest cause of the syphilis prevalent in New Zealand. The only legislation now relating to the social evil is directed not for the purpose of checking it or preventing the spread of the disease, but for the purpose of preventing disorder in public places and annoyance to neighbours. Thus the Police Offences Act, 1908, imposes a punishment on any " common prostitute " who for the purpose of prostitution loiters or importunes passengers in a public place, or who behaves in a riotous or indecent manner in any such place. It also provides for the punishment of persons who have no visible lawful means of support, or who habitually consort with reputed thieves or prostitutes. There are other provisions in the Justices of the Peace Act imposing punishment on persons who keep or assist in the management of brothels, or who knowingly permit their premises to be used as brothels. It has been decided that a place in which only one woman receives her patrons is not a brothel.

There is no legislation providing for the compulsory treatment of persons suffering from venereal disease, except in the case of persons voluntarily submitting themselves for treatment. Then they may be detained until they cease to be a menace to the public health. (Clause 19, Hospitals and Charitable Institutions Amendment Act, 1913, No. 56.)

Control.

This Committee recommends—

(1.) The provision of free treatment at all general hospitals and public dispensaries; advice to be available at hours suitable for all classes of patients. Beds should be provided in all general hospitals for treatment of such disease, no reference being made to any wards as being lock wards.

(2.) The control of the disease amongst merchant sailors. Our information shows that the disease is brought to New Zealand mainly from Australia and Oceania. It is asserted by those acquainted with the men that they are apparently ignorant on the subject, yet probably willing to learn. We advise that merchant seamen be treated in the same way as sailors are in the Royal Navy. To do this it would be necessary that every steamer trading on the routes to the places mentioned should be compelled to carry the necessary preventive treatment adopted in the navies. There should be, by regulation, pamphlets available referring to the nature of the disease and its prevention, and information should be given as to places for free treatment. As to the value of such measures, one turns to the British fleet in Australian waters for information. The Fleet Surgeon on the Australian Station states that only one case of syphilis in the last three years and a half was contracted in New Zealand. The Fleet Surgeon of the battleship H.M.S. "New Zealand" has notified that no case of syphilis was contracted in New Zealand during the stay of the vessel in the Dominion. In fact, only two cases of gonorrhoea were notified. In 1905 thirty-eight syphilitic and chancroid cases per thousand were reported in the Australasian Squadron; in 1900 the number was twelve, and Sydney was responsible for 66 per cent. of these cases, Melbourne and Hobart 11 per cent. each, Auckland 3 per cent., and the remaining 8 per cent. were distributed between seven other cities of Australia and New Zealand. It may be mentioned in passing that the Fleet Surgeon in 1910 thought that the Prisoners Detention Act had been a potent factor in the diminution of venereal disease amongst the men. There can be no question that the simple measures adopted in the navies have had a very marked effect in reducing the amount of syphilitic infection. The Journals of the Royal Army Medical Corps contain several references to the influence of these precautions. It is recognized in the Navy, according to the evidence of the Medical Director-General given to the Royal Commission on Venereal Diseases, November, 1913, that the education of the men by means of lectures is beginning to show good results, and the sharp fall in invaliding from venereal disease was to a certain extent attributed to this. It may be mentioned with regard to the Navy that no person suffering from active venereal disease is allowed to land whilst the ship is in any port.

Diagnosia and Treatment.

It is essential for the purpose of effective treatment that microscopical and bacteriological methods of diagnosis of this disease should be available in the four principal cities of the Dominion. The laboratories must be under the official control and management of a skilled bacteriologist. These establishments would be of immense benefit to the hospitals, mental hospitals, gaols, and other public institutions of the Dominion, as well as to the public generally. They are already established in Dunedin, Christchurch, and Wellington. The value of having such laboratories in the four principal cities would be that practitioners would be able to establish a diagnosis with as little delay as possible. Their practical efficiency depends to a great extent upon the rapidity with which they can supply the necessary information.

The diagnosis of syphilis can in the earlier stages be very readily made long before the organisms have reached the general circulation.

At this stage—that is, before the signs in the shape of rashes, &c., are visible to the naked eye—the disease is curable without a prolonged course of treatment. The percentage of cures after proper treatment at this time may be reckoned nearly 100 per cent., though each succeeding day the chances of cure progressively diminish, until finally, after the second year, when, though the outward manifestations may be abolished, the infection is very difficult to eradicate.

The Committee believes that syphilis is beneficially and quickly affected by appropriate treatment. Its disappearance in the community seems to be accelerated by natural and social causes in this Dominion; hence means should be taken as far as possible to prevent the entrance of infected individuals, and to offer them free and efficient treatment by the medical profession. An absolute necessity is legislation preventing the treatment of syphilitics by unqualified persons. The Wassermann blood-test and the treatment of salvarsan can only be made use of by medical men. They now permit the medical profession to speak with certainty where they previously had to rely on impressions. They have shown that the disease is more widespread than was thought previously. It is definitely proved that if adequately used they could nearly always cure the disease in its earliest stages (*vide British Medical Journal*, 22nd November, 1913). Hence the necessity from the public standpoint of placing the public and private treatment of syphilis in the hands only of qualified medical men, for the only treatment available to unqualified persons has never, in the opinion of the most eminent pathologists, cured a single case of syphilis.

Dr. Wassermann has stated that the fate of every syphilitic is decided within the first two years following the infection. Neglect of treatment during this period cannot, so far as medical knowledge now goes, be made good afterwards.

Another important point is that under the older methods of treatment a large number of cases (minimum of 8 per cent. of those affected by syphilis) which had been apparently cured developed conditions known as parasyphilis. This includes general paralysis and locomotor ataxia, which may be roughly described as degeneration of the brain and spinal cord respectively. Under more recent methods of treatment by salvarsan, or salvarsan and mercury combined, the symptoms are so much more quickly and effectively removed that it may be inferred that the number of cases of subsequent parasyphilis will be correspondingly diminished.

As regards the safety of treatment offered by the profession, in a series of 3,800 injections given under proper supervision and technique, and in properly selected cases, the mortality was nil.

In another series of 6,000 cases one death has occurred, but with precautions now taken that death might not have happened. Consequently we think the administration of the modern treatment so safe as to justify its recommendation as a public measure in all ordinary cases.

Notification.

The consideration of this is under two heads—(1) compulsory; (2) encouraged, but not compulsory.

This Committee considers that notification of contagious disease of any kind is sound in principle and in the interests of public health. All serious contagious diseases except syphilis are notifiable by law. Syphilis, a very contagious disease, has not hitherto been placed amongst notifiable contagious diseases because of its peculiar association with the morals of people and the ethics of private life.

In reference to compulsory notification, at the International Congress held in London, 1913, there were assembled in large numbers " the most eminent authorities on syphilis of the day, both British and foreign. The opinions voiced and the experiences related must rank as of the highest value, both for the regulation of public opinion and for the guidance of the Legislature " (*vide British Medical Journal*, 16th August, 1913). Professor Blaschko (Berlin) said there must be no compulsion. Professor Finger (Vienna) did not believe in compulsion. He was pessimistic as to the results of the notification now on trial in Denmark. The only measure to meet the case, in his opinion, was a limited confidential notification to the Health Department. Major French (Royal Army Medical Corps) proposed medical notification of the disease. Professor Gaucher (Paris) thought that State measures should not imply compulsion, as that would lead to concealment. Professor Pontoppidan (Copenhagen) explained the measures which had superseded the compulsory system in vogue in Denmark prior to 1906. At the present time notification of venereal disease by both patients and doctors was encouraged, but was not compulsory, and there had been an enormous increase of attendances both for notification and treatment. He did not, however, believe that the statistics would show any decrease in the actual number of fresh notifications per annum. It would mean many more years of work before this could be effected. Dr. Carle (Lyons) favoured non-compulsory measures. Dr. Helen Wilson and Dr. Horace Vinrace, both of London, were amongst the general speakers. They did not admit the necessity for notification, forced or voluntary. Dr. Woods Hutchinson, of New York, insisted on some kind of notification. Coercive measures were only indicated in the case of the incorrigible or the feeble-minded.

In reference to encouraged but not compulsory notification, it goes without saying that every medical practitioner would inform a syphilitic patient of the necessity of undergoing a thorough course of treatment until he was cured; also of the danger of spreading the disease until such course has been carried out. If the medical practitioner had reason to believe that the patient was not carrying out the prescribed treatment in a satisfactory manner, the practitioner ought to be encouraged to warn the patient that it might be necessary for him to notify the authorities confidentially about his disease. After having assured himself that the warnings have been neglected he should thereupon notify the authorities if he considered that the person would be a menace to the public health. In no case ought a medical man to endeavour to implicate another person through any information given to him by the patient, but he should advise the latter to inform any second party of his (the patient's) condition, and request that the second party should seek medical advice. But no system of confidential notification by medical men will be of any use unless unqualified persons are by law prevented from treating this disease. The Committee therefore recommends that syphilis be declared a notifiable disease, that the notification be encouraged but not compulsory, and that the Chief Medical Officer of Health should be the only person to whom the notification be made.

In order to guide the ignorant to efficient advice and so prevent concealment, the Committee recommends that legislation be enacted against the treatment of this disease by any unqualified person. This is recommended by the Medical Inspector of the Local Government Board in his evidence tendered to the Sydenham Royal Commission on Venereal Diseases. To recapitulate the arguments given in the earlier parts of our report, it is incontrovertible that effective methods of treatment can be carried out only by duly qualified medical practitioners; that the treatment carried out by unqualified persons may temporarily conceal the disease during the period of the first two years, when modern treatment is effective; that during the first three years medical supervision and advice are of vital importance, as the syphilitic then is most likely in the unmarried state to disseminate the disease in its active form, and, when married, to his progeny as well; that the older methods of treatment, consisting of drugs by the mouth, &c., are unable to cure positively any case; that if free public treatment be provided the ethics of the profession will ensure that the confidences of infected persons will be more effectively guarded by a qualified official than they would be by a person so unscrupulous as to treat a disease of which he is of necessity greatly ignorant.

Recommendations.

The Committee recommends—

(1.) That syphilis be declared a notifiable disease; that notification be encouraged, and discretionary but not compulsory; and that the Chief Medical Officer of Health be the only person to whom the notification be made.

(2.) That provision be made through the Hospital Boards to establish laboratories in the four centres, where not already existent, for the diagnosis of syphilis.

(3.) That free treatment in the public hospitals and dispensaries be provided for syphilitics.

(4.) That steps be taken to educate the mercantile marine as to the dangers of syphilis, and that provision be made for preventive treatment on the intercolonial service.

(5.) That legislation be enacted against the treatment of syphilitics by unqualified persons.

William E. Collins (Chairman).
L. E. Barnett.
D. Colquhoun.
W. J. Barclay.
G. E. Gabites.
H. T. D. Acland.
S. A. Gibbs.

W. McKay.
E. E. Porritt.
H. D. Robertson.
J. W. Williams.
E. A. W. Henley.
J. Hardie Neil
(General Secretary).

DISCUSSION.

At the afternoon sitting of full Congress the report of the Committee on Syphilis, presented at the meeting on the 9th February, was considered, together with the following memorandum and resolutions which had in the meantime been circulated :—

Revised Edition.

Memorandum and Resolutions to be submitted to Congress by Dr. J. W. Barrett, Mr. G. A. Syme, Dr. Worrall, and Dr. P. Fiaschi (after consultation with members of the New Zealand Special Committee on Syphilis).

This Congress desires to submit to the various Governments of Australasia the following summarized observations and recommendations :—

Venereal diseases are proved to be responsible for a vast amount of damage to mankind. The damage is expressed by loss of life (frequently at its prime), insanity, sterility, destruction of family life, inefficiency, and economic waste. The monetary loss to the nation is enormous. The exact distribution of these diseases is unknown, but it is estimated by excellent authority that one twenty-fifth of the population of Berlin, Paris, and New York are annually infected. It is fairly certain that 12 to 15 per cent. of the population of London, Paris, and Berlin are syphilitic, and, in addition, a much larger number are gonorrhoeic. There is good reason for thinking that Australian cities are affected to much the same extent. There are no other diseases which cause so much loss to the community.

By the adoption of suitable measures these diseases can be greatly reduced in frequency, and may be wholly suppressed. The steps which should be taken are,—

1. The provision for education, after consultation with educational experts as to the lines to be followed, of adults and adolescents in the nature, causes, consequences, and mode of prevention of venereal diseases.

2. Provision of free scientific facilities for effecting the early and accurate diagnosis of venereal diseases, and for testing the results of treatment.

3. The provision of free treatment, both in- and outdoor, at times convenient to the patients, for all those who are unable to make their own arrangements.

4. The passage of legislation providing for—(*a.*) The detention of any prisoner suffering from venereal disease until by treatment he or she is rendered innocuous (the Prisoners Detention Act of New South Wales already makes such provision). (*b.*) The severe punishment of any one who wilfully or negligently communicates venereal diseases to other people. (*c.*) The severe punishment of any one, not being a qualified medical practitioner, who undertakes to treat sufferers from venereal diseases. This provision is very necessary, because of the danger to innocent persons consequent on the unsuitable treatment of the infected.

Note.—The resolutions quoted above embody principles. Their mode of application would probably be a subject of discussion between the respective Governments and the branches of the British Medical Association.

The monetary cost of effecting the eradication of venereal diseases would not be very great ; in fact, the expenditure would be very small by comparison with the expenditure resulting from the present wholesale infection of the populace. There is no form of public expenditure which might so truly be described as national and reproductive.

If the steps indicated are taken with wisdom the results will be—Diminution of mortality ; diminution of insanity ; diminution in the expenditure in hospitals and asylums ; increased human efficiency ; and better and healthier enjoyment of life.

The PRESIDENT : This afternoon we have before us what is perhaps one of the most important matters to be dealt with by the Congress—the discussion of the report of the Special Committee on Syphilis. I have very much pleasure in introducing Dr. Collins, Chairman of the Special Committee.

Dr. W. E. COLLINS (Wellington) : Mr. President, ladies, and gentlemen, I wish first of all to tender apologies from Dr. W. J. Barclay and Dr. G. E. Gabites, members of the Committee, who are unable to be present. I would also ask you to pass a vote of thanks to the Hon. the Minister in Charge of Hospitals and of Mental Hospitals in New Zealand (the Hon. Mr. Rhodes) for kindly allowing us to be furnished with statistics from the various hospitals of the Dominion ; and another vote of thanks to the Minister of Justice (the Hon. Mr. Herdman) for allowing us to obtain information from the prisons of the Dominion ; and yet another to Mr. T. W. Leys, editor of the Auckland *Star*, who is a leading man in this community in all public matters, especially those relating to education, and has taken great interest in this question, for information supplied. I move, That votes of thanks be tendered to those gentlemen.

Motion carried by acclamation.

Dr. COLLINS : When the Committee on Syphilis was set up by the Executive it held its first meeting in Wanganui. Since the last meeting of Congress the Committee has devoted a great deal of time to its investigations and to the preparation of its report, which was duly presented to the business meeting of Congress on Monday last. On the Saturday previous to that meeting we received a radiogram from Dr. Barrett, sent from the steamer "Maheno," asking that some members of the Committee should meet the Australian Committee as early as possible after their arrival. Dr. Barrett and his colleagues had come from Australia with the desire to enlarge the scope of the discussion and include the question of gonorrhoea. It was arranged that there should be a meeting of the Committee in Auckland, and at that meeting Dr. Barrett proposed that a memorandum and resolutions which the Australian representatives had drawn up should be submitted to Congress together with the Committee's report. The Committee considered the matter, and felt that the subject of venereal diseases generally was of such great importance to the community that it was only right that we should fall in with the views expressed by Dr. Barrett and his Australian colleagues. Therefore it was arranged that at this meeting I should speak upon the report of the Committee, and Dr. Barrett should then speak upon the memorandum and resolutions drawn up by himself and the Australian representatives; and after six other speakers who had been invited by the Committee to join in the discussion had spoken from the platform any member of the Congress who desired to express his views should be given the opportunity of doing so.

With reference to the Maoris of New Zealand, there is no evidence at all, as far as I can make out, that syphilis prevailed amongst them prior to the arrival of the Europeans. It is still more curious that there seems to be very little record, if any, of the occurrence of framboesia amongst the New Zealand Natives in the pre-European period, which is the more remarkable in view of the fact that framboesia was common among the inhabitants of Rarotonga and other South Sea islands. This curious fact might appear to have some bearing on the relationship of the two diseases.

The late Major H. C. French, R.A.M.C., a well-known authority and specialist on venereal disease, has made the following statement: "That this disease, syphilis, strikes not only those who expose themselves to it, but strikes also, and in greater number, the innocent. It costs the country millions of pounds; it fills many homes with preventable misery; overcrowds our workhouses, prisons, and lunatic asylums with imbeciles and criminals; and, if uncontrolled, may eventually endanger the very existence of the country." Professor Fournier, in his work on syphilis, draws attention to the part which is played by syphilis in the terrible infant mortality, which, he says, is the principal cause of the present depopulation of France.

Such is syphilis as it is seen in the overcrowded countries of the Old World; such is the disease which occupied the attention of the Royal Society of Medicine for several days in June, 1912, when the matter was discussed by the most prominent specialists in the United Kingdom. Following on this great discussion came the International Medical Congress which was held last year in London, and probably the event of greatest importance at that Congress was the discussion on this same disease, a discussion which resulted in the setting-up of a Royal Commission to inquire into the subject.

We have to be thankful that the disease is not so widespread or prevalent in this Dominion; but should it ever, as our trade and population increase, and as our cities become more congested, develop here into such a scourge as it is in the older countries, then the blame will partly rest on our shoulders, but more so on any Government which refuses to heed the note of warning uttered by the profession, and mostly on the shoulders of what must be termed an apathetic public. That we have this disease amongst us every medical man is fully aware, and this report that we have the honour to place before you shows that it is not altogether uncommon. One cannot help feeling that if one desires that the public should have cognizance of the presence of any disease which is seriously affecting the well-being of the people, such disease ought to have some official recognition. Yet, though the disease is fairly common in this small Dominion, with its population of a million people only, if we turn to the "Official Year-book" and glance over the vital statistics, as far as New Zealand is concerned, syphilis is officially an unknown disease; but if we look more closely into those statistics, and note the deaths of children under one year, we see that in 1912 there were deaths from—(1) premature birth, 398 cases, the percentage of total deaths of infants under one year being 28·25: (2) congenital debility, 254 cases; percentage of total, 18·03: (3) malformations, 117 deaths; percentage of total, 8·30. No account is taken of miscarriages which take place prior to the viable age; these are not notified or certified to. Should they not be, when possible, for statistical purposes, and also as a slight check on a serious crime?

The tendency for women who have been infected by syphilis to abort, or to have premature births, is well known to the profession, and it is also well known that children born of syphilized women are ill-nourished, immature, weakly, and show signs of inherited disease, and very frequently die within the year of birth. The terrible havoc which may be caused by syphilis may well be illustrated by citing one history out of many quoted by Dr. F. W. Mott. In this case the mother married at twenty, the father being twenty-two years of age. There were twelve children: the first died as a five-months foetus; the second died as a five- or six-months foetus; the third died as a six- or seven-months foetus; the fourth died as a seven-months foetus, after living eight hours; the fifth, born alive, very frail and delicate, ulcers on legs, and inflammation of the eyes; the sixth, a girl, aged fourteen, suffering from juvenile general paralysis, with well-marked signs of congenital syphilis; the seventh, a girl, living well, aged sixteen; the eight, a boy, living well, aged fourteen; the ninth, a boy, living well, aged twelve; the tenth, a boy, died of convulsions, aged eleven months; the eleventh, a girl, died at eight months, brain-disease and club-foot; and the twelfth, a boy, living well.

All of us could quote similar but perhaps less startling experiences, and I simply cite this case as an example of what a potent factor syphilis is in causing foetal death, death by premature birth, death in infancy, premature death of young children, and the factor that this disease may be in causing malformation. Many such cases could be quoted, and I therefore think that we may reasonably infer that, at any rate, a large number of cases of death by premature birth may be put down to the effects of this disease; that most of those due to congenital debility may be attributed to the same cause; and also the same may be said of the deaths from malformation, such as spina bifida, meningocele, and hydrocephalus, &c.

There seems to be a fairly unanimous opinion among specialists in eye-work that congenital syphilis is very common. The finding of the Wassermann-test reaction is that all mothers of syphilitic offspring give positive blood-reactions, the inference being that many women are very detrimentally influenced by carrying syphilitic offspring. The Wassermann test shows that syphilis plays a much greater part in the production of imbecility and idiocy than has been generally supposed to be the case. If one turns to the causes of death in the "New Zealand Official Year-book," classified under fourteen different heads, one finds—(1) general diseases; (2) nervous system and organs of special sense; (3) circulatory system; (4) respiratory system; (5) digestive system; (6) genito-urinary system and adnexa; (7) puerperal conditions; (8) skin and cellular tissue; (9) organs of locomotion; (10) malformations; (11) infancy; (12) old age; (13) violence; (14) ill-defined causes.

The next table shows the number of deaths from each principal cause, but syphilis as a disease is not mentioned. If one inquires further, and glances over the Registrar-General's more detailed tables in 1912 as to the causes of death, we find that under "General diseases" syphilis is mentioned as having caused fifteen deaths—eight in men and seven in women; but I also find that the deaths by the diseases in which syphilis has been known often to be the first cause are fairly numerous, such deaths being due to—(1) simple meningitis, 136 deaths. None of these were tubercular; tubercular meningitis is mentioned separately. Now, simple meningitis may frequently have as its origin the syphilitic virus, as is well shown in a case which Dr. Mott mentions. This is the case of a woman, aged forty-four, who was married at the age of twenty-two to her husband, by whom, after the birth of a still living child, she was infected by syphilis. An energetic treatment of husband and wife with mercury and iodine was adopted. In the course of the following years she had six children, who all died at ages from eighteen to twenty months from symptoms of meningitis. Six years after the death of her husband she married a healthy widower, father of two healthy children, aged respectively sixteen and nineteen. Twenty-two years after the primary infection, and by her healthy husband, she gave birth to a child. This child, as the former ones, died at the age of eighteen months, with symptoms of meningitis. Returning to the schedule, we find—(2) locomotor ataxia, 4 deaths; (3) myelitis, 7 deaths; (4) cerebral haemorrhage, 221 deaths; (5) general paralysis of the insane, 39 deaths—34 men and 5 women; (6) other forms of mental alienation, 30 deaths; (7) convulsions, 65 deaths; (8) epilepsy, 69 deaths; (9) brain-degeneration, 20 deaths; (10) tumour of the brain, 19 deaths; (11) organic heart-disease, 1,201 deaths; (12) aneurism, 32 deaths; and (13) arterio-sclerosis, 74 deaths: and I believe that most of us have seen cases where the general health has been so enfeebled by syphilis that the individual has fallen an easy prey to other forms of disease, notably that of tuberculosis.

In none of the causes of death which I have cited may the original cause have been infection by the *Spirochaeta pallida;* but, still, if one remembers the peculiar nature of this disease, the slight initial lesion, the not very grave secondary symptoms, and if one also recognizes that the virus is slowly but certainly causing changes in the most vital organs of the body—the brain and nervous system, the heart and the arteries—it is impossible, especially in those who die at a premature age, not to believe that in some, at any rate, of those deaths the original and primary cause has been syphilis.

This brings me to the points which I desire to make: (1) That the disease should have official recognition; and (2) that if it is our aim to arrive at a true conception of the effect of this disease we ought to be able to obtain accurate statistics, based on some uniform plan, for the whole of Australasia. The only means I can suggest for this purpose is that the medical certificate of death which we have to fill up should contain more definite information as to the primary and secondary causes of death, and that these fuller details, with the certificate, should be sent direct to the Registrar-General by the medical practitioner, and not be handed, as is done at present, to the patient's friends or to the undertaker. No practitioner cares, for obvious reasons, to put syphilis down as the primary cause of death on the certificate. I will cite one case that has come under my observation recently. A woman, aged thirty-four, was infected by syphilis. After marriage she had two miscarriages, then a premature birth, and then subsequently she gave birth to a living child, which had evidence of congenital trouble. She herself developed marked arterio-sclerosis, had cerebral haemorrhage, became hemiplegic, and died. No mention of the primary cause, as I am informed, was given in the death-certificate, and for obvious reasons. Wassermann was positive, and salvarsan was of no use in this case. The only other method I can suggest is that as our knowledge advances, and the tendency for greater precision and accuracy in all scientific studies becomes more and more pronounced, in our principal cities the certificate of death should be filled in by a pathologist after he has made a post-mortem examination. Medical men can appreciate the value of such scientific accuracy to the public and to the profession. We know that syphilis is responsible—and I here quote from a portion of the resolution passed at the meeting of the Australasian Medical Congress in October, 1908—for an enormous amount of the damage to mankind; but, at any rate as far as our vital statistics are concerned, in New Zealand the damage would not appear to be very great. Still, 301 practitioners in the Dominion have reported 1,941 cases of primary and secondary syphilis in two years; thirteen general hospitals have reported 192 cases of primary and secondary; and other institutions have recorded somewhere about thirty-six cases. Yet the Government has no official knowledge of this disease, neither through the vital statistics nor through the official reports of the Department of Public Health.

With regard to the hospitals—and I would here like to suggest that more complete data should be kept with respect to this particular disease—a curious custom which has been handed down for, I may say, generations is that this disease, from its nature, should not be admitted into the public hospitals. It would appear that in years gone by subjects of this disease were not considered right and proper people to be admitted to such institutions, which were only intended for the pure and virtuous. This line of thought is still evident even in New Zealand, where certain hospitals refuse to take in such cases. It is to be hoped that this will be altered.

A report of very great interest has been received from the Hon. Dr. Lynch, from Suva, which seems almost to bear out Sir Jonathan Hutchinson's views as to the similarity between the two diseases framboesia and syphilis, and I will simply state that further investigations with regard to framboesia in the South Sea Islands will be of the very greatest interest. I notice from an extract in the latest edition of Muir and Ritchie's Bacteriology that Castellani has discovered an organism in the lesions of framboesia which closely resembles the *Spirochaeta pallida*—the organism of syphilis. Castellani calls it *Spirochaeta pertenuis* or *pallidula*. The organism is present in considerable numbers, especially in the epidermis. Castellani claimed that it transferred the disease to monkeys, and demonstrated the organism in the unbroken skin-lesions; he also found the organism in the lymphatic glands and in the spleen. His claim with regard to the presence of the *Spirochaeta pallidula* in the lesions and in the inoculation of apes has been confirmed. It has been shown by Nicholls that a framboesia lesion of similar character to the syphilitic lesion can be produced in the testicle of a rabbit, though the inoculation period is shorter, and that the best means of distinguishing the two diseases is to inoculate the skin of a monkey. In framboesia the skin became elevated, slightly scaling, and very oedoematous; in syphilis it is flat, dry, and very scaly. The period of incubation is shorter in framboesia. The immunity reactions in monkeys infected with syphilis and framboesia have been studied by Castellani, Neisser, Baermasson, and Halberstater. They go to show that the diseases are distinct. Levaditi and Nattan-Larrier found that although monkeys infected with syphilis were refractory to framboesia, monkeys infected with framboesia were susceptible to syphilis. They therefore concluded that framboesia is a modified form of syphilis. Patients suffering from framboesia generally give a positive Wassermann reaction, and they are very amenable to treatment with salvarsan. The actual relationship of the two diseases cannot be accurately defined, but they are probably distinct, though closely related.

In order to compare the prevalence of syphilis with other notifiable diseases, I have been supplied by the Public Health Department with the following information: That there were during the last two years reported to the Health Department 2,036 cases of tuberculosis (including phthisis), 3,126 cases of scarlet fever, 1,663 cases of diphtheria, and 1,299 cases of typhoid. These were notified by 690 practitioners. Syphilis cases number 1,941, recorded by 301 medical men.

Three years stand out prominently as marking a very great increase in our knowledge of this particular disease: 1905, when Schnaudin discovered the *Spirochaeta pallida* in persons suffering from syphilis; 1907, when Wassermann made his notable discovery, which is known as the Wassermann test; and 1909, when Ehrlich discovered his remedy of 606, or what is known as salvarsan. I think I may say that it is owing to these discoveries that medical men have endeavoured to bring the devastating nature of this disease more prominently before the public for the benefit of public health, because not only can they now speak more emphatically as to the damage done, but they can also hold out some brighter and clearer hope that the disease may be treated with greater success than hitherto. But all of us will still gratefully pay a tribute to the late Sir Jonathan Hutchinson for his very accurate investigations, and for his treatment of the disease, which, if it did not certainly cure, robbed it of some of its more loathsome features; but the hope expressed that syphilis might be cured by a regular course of treatment of mercury for a period of two years has not been realized.

After the Medical Congress held in Melbourne in 1908, when the subject was very earnestly debated, and when the very clear and concise resolution was passed that syphilis is responsible for an enormous amount of damage to mankind, and that the preventive or remedial measures directed against it are worthy of the utmost consideration, I understand that the Government appointed a Committee of medical men to make an inquiry into the question as to the prevalence of venereal disease in the City of Melbourne. This inquiry was made by a system of notification by medical men to the Committee, and the result proved that the disease was common in the city and the immediate suburbs. The Committee advised that special attention should be drawn to the matter by the newspapers, and by means of pamphlets and other methods of educating the people with regard to the prevalence, the nature, and the effects of the disease. Whether that investigation by the Committee has caused any special legislation in Victoria I am unable to say; but the results of the investigations of that Committee, and the investigations also in New South Wales by prominent members of the profession, ended in a very important measure being passed into law in 1908—namely, the Prisoners Detention Act. I regard this measure as being one of very great importance, and should like to have seen it adopted in this country, because I feel that the class of people who are detained in the prisons are by that very fact more or less of an irresponsible type, and are likely to have less regard not only for their own health, but for the health of those whom they come in contact with. I therefore shall read in full the report of the Controller-General of Prisons in New South Wales on the working of this Act :—

> Under the Prisoners Detention Act, 1908, prisoners found to be suffering from certain contagious diseases may be detained in lock hospitals, which have been established at eleven gaols, for periods concurrent with or in some cases in excess of the imprisonment imposed. The following statement shows the extent of operations during the last two years :—

—	Treated.		Discharged Free from Disease.	
	Males.	Females.	Males.	Females.
1910.				
Persons under orders	48	14	44	13
Persons eligible for orders	28	4	17	2
Persons not eligible under the Act ..	60	2	9	1
1911.				
Persons under orders	55	15	43	12
Persons eligible for orders	14	5	11	3
Persons not eligible under the Act ..	52	7	14	..

> Of the cases not subject to the provisions of the Act, a number of persons in addition to the discharges shown above were released while still not free from contagion. During the three years the Act has been in operation 151 such cases—127 men and 24 women—have been discharged. The obstacle to their detention is found in the fact that orders for their detention can be obtained only when direct imprisonment is imposed, thus excepting cases in which fines are imposed.

Following on this, Queensland, in 1911, passed an Act which made notification compulsory, and prevented, with certain limitations, the treatment of this disease by any other person than a medical practitioner.

Last year the New Zealand Legislature introduced a clause into the Hospitals and Charitable Institutions Amendment Act, 1913, which may have an important bearing on the control of this disease. It was primarily introduced, I believe, in order that the Department should have greater control over certain cases of tubercular disease. If it is right that no person suffering from an infectious disease—such as, for instance, scarlet fever—should be allowed out of an institution until the danger to the public health is at an end, then it is reasonable to infer that no person suffering from this particular form of contagious disease who happens to be in any hospital, prison, or other institution should be permitted to leave that institution until the same result has been achieved. If the regulations which His Excellency the Governor, by Order in Council, may from time to time gazette have this effect, then this clause will be a very important factor in diminishing the amount of this particular disease in the Dominion.

Practically, in New Zealand there is no evident prostitution, and persons who keep or assist in the management of brothels are subject to punishment ; but we have the peculiar position that one woman who lives in a house by herself may carry on the trade of prostitution without being in any way subject to the laws of the country. That this is so has been exemplified lately in a case which came before the Stipendiary Magistrate in Christchurch, where a woman was charged that within the space of the last six months she was deemed to be an idle and disorderly person in that she had insufficient lawful means of support. This woman admitted that she was a prostitute, but she carried on her business in a house which was her own, and she had money in the bank. Whether she was diseased or not there was no means of telling, although there was more than a suggestion that she was suffering from disease. The case was dismissed. The Medical Officer of Health in Christchurch stated that he was helpless in such a case, and in dismissing the case the Magistrate thought that there ought to be some amendment of the law. But it does seem an anomalous position that a woman who chooses to live by herself can carry on such a trade with impunity. There is no doubt that within a shorter or longer time she would become the vehicle of disease to others, if she is not so already, and so affect the health not only of those who visit her, but of their descendants.

With regard to the treatment of the disease, there seems to be no doubt that in the large majority of cases, if taken early, a cure may be effected. Whether this is so or not remains for the future to reveal. I may quote two cases out of six or seven recently treated by me, which are of an illustrative nature. The first is that of two brothers—one aged thirty-six and the other aged forty-one—who both contracted the disease about the same time, in their younger days. When the younger one first came under my observation he was suffering from general paralysis of the insane, and had to be removed to a mental hospital. The other one, who came under my observation shortly afterwards, was always of a rather weakly nature, and became suddenly affected with intense pains in the head, dilatation of the right pupil, and partial deafness in the right ear. He became very morbid; nothing would interest him; he gave up work, and sat for hours together in a condition verging on melancholia. He was given an intravenous injection of salvarsan, and very shortly his headaches became less severe. This was followed some weeks afterwards by an intramuscular injection of the same drug. After the last injection his headaches disappeared, his pupil became normal, gradually he became brighter and took more interest in outside affairs, and now he is moving about among his fellows, apparently restored to health. Of course, he is not cured; but had it not been for the doses of salvarsan I confidently believe that he would have also become an inmate of a mental hospital.

With regard to notification, no method of notification will be of the slightest use unless unqualified persons are prevented from treating the disease. However, the Committee believes that notification of any contagious disease is sound in principle and for the good of the public health. If it is considered necessary that chicken-pox, smallpox, scarlet fever, and other contagious diseases should be notified, it would seem logical and right from a public-health point of view that syphilis should also take its place amongst such diseases. However, the Committee has recommended that syphilis should be declared a notifiable disease, that the notification be encouraged and not made compulsory, and that the Chief Medical Officer should be the only person to whom such notification should be made. Personally, I am a little doubtful about how notification by encouragement will act. My reason for this feeling is that the Committee issued circulars to all the medical men asking them for information for the purposes of this report. The result has been that out of 1,201 medical men whose names are on the register, 301 have forwarded replies. I may say, however, that our medical register is rather a misleading document, and sadly needs purging, as there are really only 690 medical men on the working register of the Health Department. Even so, the fact that there were only 301 returns is not encouraging. The recommendation of the Committee in regard to notification is the result of the opinions of very eminent men who have given earnest consideration to the subject; but these men are speaking for countries where the effects of education are not so easily brought about, because of their great populations. It would appear to me that in a young country with a limited population, isolated as we are, and knowing that the disease is chiefly confined to our main seaport towns and is brought into the country from outside places, some more pronounced form of notification would be of benefit. I cannot help feeling that if after investigation the Government would pass a law by which the disease could be made compulsorily notifiable—say, in eighteen months' time from the time of passing such a law—it would enable the people of the Dominion in the meantime to be educated up to the importance of checking this disease. It would enable those who are so unconcerned about their own health or the health of other people, and who might fear compulsory notification, to leave the country if they so desired. By this means I believe that in the course of two or three years the primary disease would become rare in this little country; and I am inclined to agree with the expression which was uttered by Professor Starling—that if the disease was given up to the control of, and "a free hand to be given to, medical science, it would disappear within twelve months." My experience is that the bulk of the people are ignorant of the nature of this disease, and of the slow, silent, and deadly results produced by the virus. Moreover, it is not an easy matter to educate them by lectures and pamphlets, and officially they are not made cognizant of it. If we desire, as I believe it is the emphatic opinion of the profession, to bring this matter prominently before the people of this Dominion, the surest and best method would be to hand some report to the principal newspapers throughout the Dominion for publication and comment.

I move the adoption of the report.

Dr. J. W. Barrett (Melbourne): I wish to present this matter from the point of view of the action which is practicable—a point of view which I may say is agreed with by the speakers who are announced to follow me. The matter was discussed by us on our voyage from Australia, and we are substantially in agreement. In the first place, I wish to second the motion by Dr. Collins for the adoption of the report. With that report, in general, we are in agreement, except that there is some little demur in regard to the proposal for notification. The Committee's pronouncement on that point, however, is rather in the nature of a pious aspiration than anything else. We shall ask later on that you submit to the Governments of Australia and New Zealand not only that report, but also the summarized observations and recommendations which you have before you.

Venereal Diseases.

It will be remembered that the problem of venereal diseases played an important part in the Australasian Medical Congress which met in Dunedin eighteen years ago. Since that time information has been collected from very many sources, and the convictions voiced on that occasion have been deepened and strengthened. The comprehensive inquiry made in Melbourne prior to the Sydney Congress of 1911 was the culminating result of discussions at the Dunedin and subsequent sessions, and was rendered possible by the support given to it by the Government of Mr. Murray.

Shortly, the inquiry consisted in—(1.) Compulsory impersonal notification of syphilis for all cases within ten miles of the General Post Office, Melbourne, including free examination of blood by the Wassermann method. (2.) The presentation of two sets of 100 post-mortem examinations made by Sir Harry Allen at the Melbourne Hospital. These post-mortem examinations were made indiscriminately, and showed gross evidence of syphilis in one-third of the patients. (3.) An examination made by Dr. Lambie at the Children's Hospital by means of simultaneous Wassermann determinations and post-mortem examinations, the object of the inquiry being to ascertain whether the gross appearances relied on by pathologists were verified by the Wassermann result. (4.) The inquiry made at the Eye and Ear Hospital, where all the patients admitted on four afternoons of the week were examined by the Wassermann method, irrespective of the disease for which they applied. Of the 550 patients, nearly 14 per cent. were shown to be syphilitic.

Since that date events have moved forward with rapidity, and the Royal Commission on Syphilis appointed in Great Britain is in part the outcome of the Australian investigation. But of late attention has been directed even more strongly to the damage done by gonorrhoea than to the damage done by syphilis. Statistical evidence relating to the destruction wrought by these two diseases is being presented in abundance. Summarized, Messrs. White and Melville, in the *Lancet* (9th December, 1911), state that medical opinion is doubtful whether to the individual affected gonorrhoea is not worse than syphilis. Of women infected, about 50 per cent. are sterile. The majority of all young men get this disease before the age of thirty, and very many marry while still infectious. The early manifestations of syphilis fill the outpatient department of general hospitals; the latter stages fill the infirmaries and asylums with senseless wrecks of humanity. As to the extent of these diseases, they are of opinion that syphilis has become of manageable dimensions, while the inroads of gonorrhoea are increasing. They estimate that in Berlin there are 85,000 fresh cases of venereal diseases annually—that is, one twenty-fifth of the whole population. In Paris they think that 100,000 are infected with venereal disease annually, or one twenty-seventh of the population. In New York, Morrow estimates that there are 200,000 infected persons walking the streets, and Bierhof believes this to be an underestimate. The proportion of persons infected annually is probably the same as in Paris and Berlin. In all these cities about one-twelfth of the total adult male population are infected annually, and about one-thirtieth of the total adult females—roughly, one twenty-fifth of the whole inhabitants. Dr. Blaschko gives his opinion that in Berlin every man who has reached the age of thirty has had (on the average) gonorrhoea once or twice, and every fourth or fifth man has had syphilis. They estimate that in London 200,000 fresh cases of venereal disease occur annually. The writers go on the say these are not statistics; they are only computations, and as such are open to reasoned criticism.

It is customary to say that syphilis is decreasing because so many practitioners either fail to see it or are of opinion that it is not as common as it used to be in their earlier experience. There is no doubt that the grosser manifestations are not so much in evidence as they used to be, and for this there appear to be several explanations. In the first place, it is suggested that a partial race-immunity has been established. If the sub-committee of the London Hospital is correct, and 12 per cent. of the population are infected with syphilis, there is much colour for this opinion. But Mott points out that only 3 or 4 per cent. of syphilitics develop disease of the nervous system. It has, however, been shown that certain women with whom successive students cohabitated conveyed a form of syphilis to those students which ended in disease of the nervous system. Noguchi has shown that there are three strains of *Spirochaete*, and the question arises whether there are several varieties of syphilis and that some are less frequent and others more frequent. Furthermore, medical men understand its treatment better, and more vigorous attacks are made upon it in its earlier stages. All these causes play their part in the modification of the clinical phenomena. But, notwithstanding this, the fact remains that if the problem of distribution be tested by the amount of nervous disease—*i.e.*, general paralysis and tabes—existing, there is no diminution, since the relation of general paralysis and tabes to the population remains the same as or greater than formerly. There does seem, however, ground for believing that the latent or submerged form of syphilis is more common than before, but that the grosser external manifestations are not so common.

Dr. Ernest Jones, Inspector-General of the Insane, in response to an inquiry of mine respecting the increase or decrease in the amount of syphilis in Victoria, draws my attention to certain phases of his annual report. Dr. Lind, a pathologist, states that out of 215 post-mortem examinations made in 1912, eighty-five cases showed evidence of syphilis, and only twenty showed evidence of tubercle. Furthermore, it is pointed out that the daily average number of resident patients in the asylum has risen from 4,455 in 1905 to 4,938 in 1912, but the deaths from general paralysis during the same period have risen from sixteen to fifty-six. Dr. Jones does not think that increased accuracy of diagnosis only has had very much to do with the increased returns, and this opinion is borne out by the fact that the male hospital wards of Kew and Yarra Bend Asylums are generally two-thirds full with cases of general paralysis, a much greater proportion than was the case nine years ago. Dr. Jones endorses Mott's dictum, " No syphilis, no general paralysis," and " no locomotor ataxia," although he thinks, given syphilis, it is necessary to have some additional irritant or predisposing factor to produce general paralysis. In his report he makes the following statement : " It is earnestly to be hoped that the new departure which the State Government has made in the direction of the treatment of cases of venereal disease by their voluntary admission to certain wards in two of the principal metropolitan hospitals will ultimately have the effect of making such diseases as general paralysis more and more uncommon. It is possible that we are on the crest of a wave that has caused this terrible wreckage of human lives, and that from now onwards as a result of prompt and efficacious treatment syphilis may decline in virulence and frequency. But so far as this State is concerned the position seems to be growing annually more serious, although it is equally possible that improved methods of diagnosis are demonstrating an apparent rather than a real increase."

The Committee of the London Hospital, which recommended the establishment of a special department in the hospital for the treatment of syphilis, quoted Erb as stating that 12 per cent. of the population of Berlin was syphilitic; Fournier as stating that 15 per cent. of the population of Paris was syphilitic. From all the data available the Committee arrived at the conclusion that 12 per cent. of the population of London might be supposed to be infected.

Unfortunately, gonorrhoea is still too often regarded lightly, whereas from the point of view of women it is probably as serious, or more serious, than syphilis, and the figures quoted by Norris in his recent work on "Gonorrhoea and Women" are remarkable. It is difficult, of course, to separate the two diseases in discussing the problem, nor is it altogether desirable; but Norris points out that of the 500,000 prostitutes who constitute a part of the population of our great cities (United States) it is estimated that 40,000 die annually, and that of these deaths 30 per cent. are due to gonorrhoea. Neisser, Bumm, and Fuhrbringer are quoted as stating that 30 to 50 per cent. of all childless marriages are directly caused by gonorrhoea.

The Committee of Seven in New York enjoys a high reputation by reason of the care with which their statistics are compiled, and they estimate that there were 220,000 venereal patients in 1901 walking the streets of New York. The Committee of Prophylaxis of Venereal Diseases, Washington State Medical Association, state that 80 per cent. of all men in large cities have had gonorrhoea once or several times; 45 per cent. infect their wives; 80 per cent. of all operations upon women for diseases of the uterus and adnexa are caused by gonorrhoea; and that 20 per cent. of all blindness results from the same cause. Bierhof estimates that there are in New York to-day one million persons affected with venereal diseases, of which 800,000 are gonorrhoeac. Morrow states that venereal diseases contribute a sum total of morbidity of nearly double that of all other infectious diseases, both acute and chronic. He thinks that a million and a half men are annually infected with gonorrhoea in the United States.

If we turn to Germany, where statistics are compiled with extreme care, we find that the total is very large. Of about twelve million persons insured in the German Empire, 750,000 are annually infected with some form of venereal disease; 100,000 persons are treated on an average daily for venereal disease in Germany; and estimates given by the Prussian Government state that 500,000 persons are infected with venereal disease yearly—another and later authority puts it at 773,000. Now, it is unnecessary to labour the point. In every portion of the world in which the matter is critically examined estimates are given of the enormous prevalence of these diseases, and it matters little whether the percentage in Great Britain were 12 or 10 per cent., or whether there were 800,000 or 700,000 gonorrhoeacs in New York—the fact remains that the sum total of disease is very great indeed.

Before, however, proceeding to deal with the remedies suggested, some reference should be made to the estimates of the cost. Howard Kelly, of Baltimore, estimates that venereal diseases cost America £625,000,000 sterling a year. How he arrives at the figures is not stated, but Norris states that these figures seem to be underestimated rather than exaggerated. It is computed that in Prussia venereal diseases cost the State annually over £4,000,000 sterling. It is clear, of course, that if the curtailment of life, if the reduced efficiency of life, and if the direct expenditure on the treatment of disease are calculated, the expenditure must be enormous. In fact, it has interested me as a matter of speculation to wonder what would happen to the medical profession of the present day if venereal disease were to be suddenly extirpated by an act of Providence. The position, so far as it goes, seems to me to be admirably summed up by Professor Starling in an introduction to an article published in *Bedrock* in April, 1913: " Syphilis is widespread among our population, and rivals tuberculosis as a cause of incapacity, sickness, and misery. It is responsible for a large amount of nervous disease and insanity, and is an important factor in infantile mortality. Though a prominent part in its spread is played by immoral intercourse, more than half of the sufferers are innocent and unwitting. It acts as no deterrent to immorality, nor is the punishment proportional to the offence or limited to the offender. Yet of all chronic infectious disorders of man it should be the easiest to stamp out. It is only transmitted by heredity and by direct personal contagion, and is not conveyed by the lower animals or by insects. Modern discoveries by Wassermann and by Ehrlich have added enormously to our powers of diagnosing the disease (even in its latent stages) and of curing it. It is amazing that a civilized community such as ours should have made no concerted effort to abolish this plague from our midst, a result which might probably be achieved in twelve months if a free hand could be given to medical science. Now that the responsibility for the national health has been assumed by the State, it is important that we should know what can be done in this direction by a community with the same ideals, prejudices, and hypocrisies as ourselves, and at my request Dr. Barrett has kindly, in the following article, given a brief account of the measures which have already been taken in Melbourne for the diminution and ultimate suppression of venereal disease. Is there any reason why similar measures should not be adopted in this country ? "

The facts are no longer in doubt. The extent of the evil is obvious to every one who inquires into it, and the question arises, What can we do ? There are many ways in which the problem can be approached, but the fundamental necessity appears to me to be a complete separation of the problem of morality from the problem of medicine. I take it that as men of trained intelligence our sympathies lie entirely with the moralists, and that as citizens we shall always be glad to take our part in any moral campaign. As physicians, however, I think we have one duty, and one duty alone, and that is the prevention and treatment of disease.

1. Hence the first step in control is the education of adults and adolescents respecting the nature of these diseases, their mode of propagation, their results, and their mode of prevention. This work has been undertaken in the most thorough-going fashion by the German Society for the Diminution of Venereal Diseases, which now possesses some thirty-one branches, and numbers some five thousand members. This society was established in 1901, and at its inception some of the ladies at the Prussian Court took office to show their sympathy with the movement.

It has distributed five million leaflets, and it now proposes to establish a permanent museum of wax models, lantern-slides, and specimens, which are to be placed in the charge of accredited lecturers and moved from town to town throughout Germany.

2. The second item in the mode of prevention is the free provision to all those who cannot afford it of treatment in the most convenient way. Many men suffering from venereal diseases are able to do a day's work, but the establishment of a night clinic or a night dispensary enables them to secure efficient treatment without the curtailment of their work. The following report from Dr. Balcomb Quick, F.R.C.S. (Eng.), will throw light on this method. The report is exceedingly valuable because it shows the honest attempt that has been made to grapple with the difficulty at the Alfred Hospital, Melbourne, and also demonstrates the difficulties that lie in the way of curing venereal diseases once contracted. The report reads as follows:—

"The night clinic at the Alfred Hospital was started for the double purpose of completing the treatment of cases on their discharge from the lock ward, and of affording wage-earners opportunities of receiving treatment for venereal diseases without interfering with their means of livelihood. Cases of syphilis which have received salvarsan treatment indoors attend the clinic for the remainder of their course, while those suffering from gonorrhoea and chancroid are, with comparatively few exceptions, treated in the night clinic throughout. These exceptions include certain cases of gonorrhoea which are acutely ill with some complication of phagedena, a number of gonorrhoea-rheumatism cases, and of bubo. To deal first with syphilis: The majority of those admitted are in the primary or secondary stage of the disease—*i.e.*, who are a menace to their associates, and in whom early and energetic treatment promises to bring about a fairly rapid and certain cure. Other cases in the later stages in whom salvarsan therapy is indicated are, of course, admitted. The ideal method of dealing with those of infectious lesions is undoubtedly to get them in hospital for a period of ten to fourteen days necessary to convert these lesions from an open to a closed condition, this length of stay giving opportunity for two or three suitably spaced intravenous injections. But there are certain objections to keeping men, who most invariably feel perfectly well shortly after the injection, in idleness about a ward. And as it has become known that patients are only kept in bed for twelve to twenty-four hours after treatment, those who are in employment almost invariably desire to be discharged at the earliest possible moment, stipulating for this before they will enter hospital. Many declare that unless they can receive their treatment during the Saturday afternoon or Sunday they will be unable to leave their work. On the whole, however, the syphilitic cases appear to regard their disease seriously, and make fair efforts to receive efficient treatment, and treatment brings about results which are gratifying both to the patient and the surgeon. One must admit, however, that the position with regard to gonorrhoea is less satisfactory. In the first place, there is, as is well known, a very general belief among the public that the disease is an inconvenient but trivial ill, to be cured by a few bottles of medicine obtained from a chemist. And while it cannot be denied that a certain proportion become well with this treatment (or without it, for that matter), the great number do not. And thus the majority of the cases that so far have presented themselves at the clinic are those that have resisted treatment for many weeks, have relapsed after apparent cure, or have become long-standing gleets. And while in early cases a proper local and general treatment, with certain precautions as to mode of living, will bring about results that may be fairly called good when the rebellious nature of the disease is considered, in chronic urathritis the opposite is the case. Here treatment, if it is to be thorough, is most tedious and time-consuming, rendering it possible for the surgeon to go thoroughly into comparatively few cases in the evening. The diagnosis of the site of the lesion must be made, and then treatment directed to it by irrigations, prostatic massage, instillations, dilatation, and vaccine. Of these measures the first two alone can be carried out by the attendant. Moreover, before a patient can be discharged as cured a troublesome and lengthy search for *Gonococci* should, properly speaking, be carried out. Thus when one considers the difficulties which beset the treatment of these chronic cases, and that even the sum total of *all* the cases which present themselves for treatment at the clinic must represent but a small proportion of the gonorrhoeacs in the population served by the Alfred Hospital, a natural feeling of impotence arises as to one's ability to grapple with anything more than a fringe of the disease as it exists in the community. The difficulties that confront one in considering the possibility of the successful treatment of gonorrhoea on a large scale in any clinic may be summarized as follows: (*a*.) Familiarity with the very prevalent diseases has begotten contempt in many cases; the serious possibilities are not realized, and thus a large number of cases resist treatment for long periods. (*b*.) This tendency is greatly increased by the fact that the majority must continue at work throughout the attack. (*c*.) Chronic cases do not always find it possible to preserve the continence that has been enjoined upon them, either through indifference or more commonly in the belief that they are cured. (*d*.) The usual result of such incontinence is a relapse, and very often the creation of a new focus for infection and reinfection. (*e*.) And, lastly, when one considers that according to statistics gathered from many parts of the world from 60 to 90 per cent. of the males of urban populations contract gonorrhoea at some period of their lives, it is apparent that an enormous amount of work and expense would be involved. In this outline of the work of the night clinic and of ideas gained by work in it mention should be made of the fact that warning and instructional leaflets modified from those in use at the London Lock Hospital are issued to the patients at their first visit. Although it is open to very obvious criticism, the plan of supplementing the matter contained in these leaflets with some information as to the value of some simple precautionary measures, such as micturition and the use of soap and water after exposure, would seem very worthy of consideration."

3. It is recommended in the London Hospital, as in Germany, that a certain number of beds shall be set aside for indoor cases. In Germany, in addition, the Universities have established chairs of venereology, and systematic instruction is given not only to medical but to all other students in the nature of these diseases.

4. To me, however, there rises a still more important question—whether it is not the duty of the medical profession to provide systematic instruction in the means by which these diseases can be prevented. It now seems perfectly clear that if before intercourse the genitals were washed with soap and water, that if after intercourse they were again

washed with soap and water, then smeared with Metchnikoff ointment, and if argyrol were poured down the urethra, these diseases cannot be communicated. The consensus of opinion among the medical officers of the United States Navy is that if the treatment is thoroughly administered within eight hours of exposure protection is almost certain. Other authorities, however, think that a shorter time covers the immune period. It is probable, then, that if these precautions were taken by every one who had illicit intercourse these diseases would come to an end. The only possible objection to the adoption of these precautions is on the ground of ethics. It is suggested that if such precautions were taken the temptation to illicit intercourse would be greater than at present. Judging from the appalling figures quoted earlier, it is clear that the risk of these diseases acts as no effective deterrent at present. On ethical grounds, the argument appears to me to fail for other reasons. The victim is not simply the offender. He may, and does, communicate the disease to other people by genital or by extra-genital means ; and, in any event, the punishment is often out of all proportion to the offence. Furthermore, if it is just and right to enforce the *lex talionis*, why not forbid treatment altogether, and let the disease wreak its vengeance on him ? As a practical man, it is clear to me that chemists and druggists are certain to put up packages of the kind, and to sell them. It would be much better if each package were accompanied by a clear, temperate, and judicial statement of the position, so that the man or woman who bought the package should have an authorized statement of the position ; and I should suggest that in each city a committee of medical men—the local Medical Association—deal with the matter formally.

5. Another measure which should be taken is the prohibition, under a penal clause, of treatment of venereal disease by any one not a qualified medical practitioner. The prohibition may seem extreme, but in view of the disaster to innocent persons which may result from ineffective treatment I think the recommendation is justified.

6. Furthermore, the Act now in force in New South Wales may well be adopted in all countries. This Act provides for the detention of any person who has been incarcerated for any offence for any period, who is found to be suffering from contagious disease, until the disease is rendered innocuous. It is questionable whether the statute-book should not contain a provision making it a penal offence for any one to communicate these diseases knowingly or carelessly.

It will be observed that I have not suggested the adoption of Contagious Diseases Acts and the regulation of prostitution by police or other authorities. This method of dealing with the problem has not gained in favour, and is likely to be partially abandoned throughout the world. The reasons for the attitude are various, but the most effective reason is that the method fails to prevent. The Report of the Committee of Seven in New York shows that in cases where the source of infection could be traced 8,053 were from public prostitutes, and 3,915 infections were the result of clandestine alliances. Furthermore, it is evident that on the grounds of abstract justice an Act of the kind should apply equally to men and women, although it is perfectly true that one infected woman can do far more damage than one infected man. It does seem to me, however, that the suppression of these diseases has been delayed rather than advanced by the Contagious Diseases Acts—not because the Acts were not partially efficient, but because of the intense opposition to them roused in the minds of people who do not fully understand the facts. The method is not completely efficient, as it is exceedingly distasteful; and, as it cannot be applied equally to men and women in practice, it seems futile, even if one believed in it, to advocate such a system.

In conclusion, I should like to make some reference to the moral problem. The average age of marriage on the part of men in Victoria is 29·85, and on the part of women 26·46 years. As long as marriage is regarded as a luxury which is to be associated with the possession of ample means and physical comfort, so long will it continue to be pushed late into life. It requires little knowledge of the world to realize that if men do not form associations in a regular way they are certain to do so in an irregular way in the main and on the average. Prostitution is frequently referred to by writers as being due to poverty. In Australia, where there is practically no poverty, and where female labour commands a high remuneration, prostitution exists in much the amount and kind that it does in other countries, and it exists for two amongst other reasons. A certain number of demoralized women wish to obtain a living without working for it, and a certain number of unmarried men form associations with them. If parents brought up their children with different social ideals, to a large extent the ground would be cut away from the pathological consequences which follow. But the factors which underlie prostitution and its evils are so numerous and complicated that I hesitate to refer to them at greater length here. It may be that as a result of these inquiries which are being made and have been made in all directions respecting the gravity of these diseases we shall evolve a set of simpler and healthier social relationships.

Summarizing, the methods which should be adopted, in my opinion, are—(1) Adequate public education of adults and adolescents respecting the nature, consequences, and mode of prevention of these diseases; (2) adequate provision of efficient diagnosis and treatment for everybody infected; (3) absolute prohibition of treatment by unqualified persons; (4) detention of persons found to be suffering from contagious diseases, and punishment of those who wilfully or negligently communicate them.

The following are the conclusions of the International Congress of Medicine held in London last year: "Sensible of the ravages wrought by syphilis on the community, and deploring the inadequacy of existing facilities for checking its dissemination, the International Medical Congress calls upon the Governments of all countries here represented—(1) to institute a system of confidential notification of the disease to a sanitary authority wherever such notification does not already obtain; and (2) to make systematic provision for the diagnosis of all cases of syphilis not otherwise provided for." Both were carried, the second unanimously.

I second in the most cordial way the motion for the adoption of the admirable report of the New Zealand Committee, and move, That in transmitting that report to the Governments of Australia and New Zealand we should also send the short memorandum which we have circulated, which embodies everything the Committee have said, with one or two little additions.

Dr. Collins: I desire to second Dr. Barrett's further proposition.

Professor Colquhoun (Dunedin): In speaking to this motion, I may say, as one of the signatories of the report, that the original motion as it stands has my entire support. I think we may congratulate ourselves on having the presence of Dr. Barrett at this meeting. Dr. Barrett's work in regard to this subject, whether we agree with it or whether we do not, has been whole-hearted and public-spirited, and has been enormously useful to his own community. In saying that, I do not for a moment commit myself to agreement with everything he proposes, and I propose briefly to criticize some portions of the revised proposals which he has brought forward. As one who can remember well the enthusiasm shown by numbers of medical men throughout the world when the Contagious Diseases Act was passed, I would caution the members of this Congress, and the younger men especially, against being in a hurry to adopt any patent methods for the abolition of an evil which has existed in all nations and at all times, and which I believe is not to be treated—or, at all events, only to a very slight extent—by legal or penal measures. We must also bear in mind that much of what has been stated by Dr. Barrett and much of what has been said by Dr. Collins is based not upon statistics but upon computations—" It is stated," " It is computed," " It is believed," and so on. I have gone into this matter from our own point of view, and the conclusion I have come to, after reading the reports very carefully, is that there has been an enormous amount of overstatement as to the evils that exist, in this community at any rate, as the consequence of syphilis and other venereal diseases. Look at what our actual information tells us—that in the course of ten years we have had in New Zealand 200 cases of general paralysis of the insane.* Surely, in the light of these figures, it is absurd to talk about syphilis filling our asylums with wrecks of humanity. Even allowing that these figures do not represent all the troubles that are due to syphilis, it is evident that the statement I have quoted, which is a sample of statements which have been sown broadcast, is a gross exaggeration. It seems to me that the crux of the proposal of Dr. Barrett and his friends lies in suggestion No. 1, for " the education of all adults and adolescents in the nature, causes, consequences, and mode of prevention of venereal diseases." Since when has it been thought desirable that this should become a function of the medical profession? Is it not our business to deal with sickness as it arises? How long has it been considered to be our duty to supply information to young men and women beyond what the ordinary laws of morality and common-sense dictate? We have no elixir of life to supply to the community. We can only say that the safety of the community lies in sobriety, in cleanliness, in self-restraint, and in consideration for one another—man for woman and woman for man. I consider that it would be one of the greatest misfortunes that could happen to us as a profession if such a resolution were adopted by this meeting. I do not believe that such a resolution would be effective. I do not believe that any State would permit the proposal to be carried out, even as a matter of expediency. I believe that the women throughout the world would rise and campaign against it as they campaigned—and compaigned successfully—against the Contagious Diseases Act. I think we may come to something that we can all agree upon with regard to the sending of the recommendations to the Governments, but I certainly shall not agree to the paragraph I have quoted, and I shall do all in my power to prevent its being passed. Except in this particular, I have no fault to find with the position taken up by Dr. Barrett. I think that if we transmit to the Governments the resolutions arrived at by the Committee over which Dr. Collins presided, that will pretty well cover the whole ground. Obviously, part of it deals merely with New Zealand conditions—as, for instance, where it is proposed to establish laboratories in " the four centres " ; but the language can easily be amended so as to apply to all the States of Australasia. I have pleasure in supporting the motion for the adoption of the report, and also, with the exception I have mentioned, Dr. Barrett's suggestion that the resolutions should be sent to the various Governments.

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* 451 are certified to has having died. See special report.—Editor.

Mr. G. A. SYME (Melbourne) : After the very full exposition of the subject which has been given in the report of the Committee, and the remarks of Dr. Collins and Dr. Barrett, there is very little left for me to say. I am here as representative of Sir Harry Allen, who had hoped to be present to speak on the subject, but has been unable to attend the Congress. It was he who first commenced the investigation of the excessive prevalence of syphilis, in a communication to the Victorian Branch of the British Medical Association, just before a session of this Congress was held in Melbourne. Many members of the profession were at the time sceptical as to the correctness of his statements. The outcome of the meeting at Melbourne was the appointment by the Victorian Government of the Commission which investigated the subject. The result of the investigations, as regards Victoria, was that it was recognized that it had become necessary to take some measure for the checking of this terrible disease. At the Sydney Congress the resolutions that were passed were made to include gonorrhoea as well as syphilis. With regard to the opinion expressed by Professor Colquhoun—that the prevalence of this class of disease has been exaggerated—I think that, without any statistics at all, the personal experience of every practitioner in this room must have shown him that gonorrhoea as well as syphilis prevails to an alarming extent. What is not adequately recognized by the profession—it is not recognized at all by the public—is the damaging nature of gonorrhoea. Let us merely consider it as a cause of sterility, and think what an amount of money is lost to the State simply through the loss of population. Our Governments in these dominions are spending vast sums of money for the introduction of immigrants. Surely that money would be much more advantageously expended in promoting our own population, and if gonorrhoea could be suppressed the natural birth-rate would be enormously increased. It should be impressed upon the public that the sterility produced by gonorrhoea is incurable, as the disease frequently leads to the removal of the reproductive organs of women. In my opinion, the statements made by the Committee in its report are not exaggerated at all. Professor Colquhoun objects to the proposal for the education of all adults and adolescents in regard to the nature, causes, consequences, and mode of prevention of venereal diseases ; but I think Dr. Barrett pointed out very clearly that in dealing with the causes of these troubles we must absolutely dissociate all moral and ethical considerations and prejudices from the discussion. Professor Colquhoun's objections are entirely based on moral and ethical considerations. If you are not going to take measures which would be effective to prevent these diseases, it would be just as reasonable to refuse to treat the diseases at all.

Professor COLQUHOUN: I do not accept that definition of my objections. I do not base my objections solely upon ethical grounds, but I say I do not believe the method of treatment proposed would be effective.

Mr. G. A. SYME: I am sorry if I misunderstood Professor Colquhoun. There is a difference of opinion. Dr. Barrett and I, and many others, believe that it would be a very effective method if it could be carried out. I admit that there are very great difficulties in carrying it out; but unless we make a start we shall never do anything with it at all. Personally, though I admit that the point is debatable, I think the method proposed would be very effective, and I say that the moral aspect of the matter must not be taken into consideration by this meeting at all. Another aspect of the question to which I wish to refer is the prevention of the treatment of this class of cases by unqualified practitioners. Shortly before we left Australia for this Congress the Federal Committee of the British Medical Association held a conference with the Federal Committee of the Pharmaceutical Societies of Australia. The pharmacists themselves voluntarily brought this question before us, and urged that we should assist them to get legislation passed for the purpose of restricting the treatment of venereal disease to qualified medical practitioners. Another point that ought to be brought out is the condition, inserted in most lodge agreements, that makes members suffering from venereal complaints ineligible for treatment at the hands of the lodge surgeon. The same rule applies in most Government institutions. For instance, in the Victorian Police Force, to which I am surgeon, if a patient comes to me suffering from venereal disease I have to notify the fact to the authorities. The patient is deprived of his pay, and also mulcted in the expense of hospital treatment. The consequence of the existence of this provision is that such persons never come to me or to the hospital—they go instead to the chemist and the quack. That is a state of things that should not exist. The payment which is made to the lodge surgeons should be sufficient to enable them to treat all cases of disease, whatever their nature—the patients should not be penalized because they happen to have these particular diseases. The ground has been so fully covered by other speakers that I will content myself with saying that I support the resolutions now before the Congress.

Dr. P. H. BUCK, M.P. (New Zealand): As the only member of this Congress representing the Maori race, I should like to say that as a Native I hold the Europeans absolutely responsible for the introduction of venereal disease into this country, and for the consequent misery and loss of life amongst the Native people. I hope that through the deliberations of this Congress, and the action which may be taken by the various Governments, we shall be able to do something to minimize the evil effects that are caused to the people—and, from my point of view, particularly to the Native people—by venereal diseases. Dr. Collins told us that he was not sure whether syphilis existed in New Zealand prior to the arrival of the European. The Maoris are of opinion that it did not exist. I may mention in support of this the story of a very old song. Venereal disease, according to the Maori, was introduced into the North of Auckland by the sailors of the whaling-vessels. There is a bay near the North Cape known as Tom Bowling Bay. Tom Bowling, curiously enough, was an old Maori chief, to whom the name was applied by the sailors, and he lived at the bay which bears his name. Tom Bowling and his tribe went whaling to the Three Kings Islands, and were in the employ of a whaling company. They were away for a considerable time, and on their return to the mainland, according to the Maori story, every one of them had venereal disease—even old women had it. In consequence of that event the song to which I have referred was composed. It begins—

Na te pakeha nana i tari mai
Te ure pukupuku, te tara kini kini.

The interpretation of that is, " It was the white man who hither brought this loathsome disease " ; and then they go on into a description of the appearance of the disease. This opinion is held by the Maoris throughout New Zealand. They say that the tribes in the north contracted the disease from the sailors, and the tribes of Taranaki and the Waikato from the soldiers. The effects of venereal disease amongst the Maoris have been very marked. Moving about amongst them as I do, I find in following up the genealogies that there are many old families, who formed the chiefs of particular tribes, which have come to an end through sterility, and with a history of having had venereal disease. I know of a family in which a man was the last of his tribe. He was married, and his wife had syphilis. They had one child, which died of congenital syphilis, and the wife bore no more children. That man had hemiplegia, and he died in a lunatic asylum from general paralysis. That tribe was ended by venereal disease. There are many other cases at the present time of men who are the last members of their tribes. Their wives are sterile, very many of them giving a history of repeated abortions, with a syphilitic history. I have known many cases of general paralysis in consequence of which the Maoris have gone to the asylum. In Niue a very large proportion of the Natives are suffering from venereal disease. I took down particulars of a large number of cases in travelling through eleven villages, and I know that there were many other cases. I have no doubt that if scientific methods of investigation, such as the Wassermann test, were applied in some of our island possessions it would be found that a very large proportion of the inhabitants are suffering from venereal diseases. One knows that in the islands morality is very lax, and that when once the disease gets into a village it goes right through the population. I heartily support some of the provisions contained in the resolutions submitted by Dr. Barrett. It seems to me that our Parliaments have been legislating for infectious diseases that come only now and again, and which when they disappear leave very little after-effect behind them. But here is a disease which is rampant amongst the population and goes right through the community, leaving dreadful after-effects not only to those whose conduct causes it to spread, but to innocent persons. Yet the State ignores its effects, and allows it to continue unchecked. We bring in legislation to deal with minor matters, but in regard to a serious matter of this kind we adopt the policy of the ostrich and hide our heads in the sand. When a Maori develops smallpox, or lives in a village where smallpox has occurred, restrictions are placed upon him—he may not travel lest he should convey the disease amongst Europeans. But a European can go to a Maori settlement and carry venereal disease among its inhabitants, and no restrictions are applied to him. The proposal to provide for the punishment of any one who wilfully or negligently communicates venereal disease to other people seems to me very sensible. According to our laws, a person who steals the purse of another can be brought before a Magistrate and subjected to a fine or to imprisonment, and yet the person who takes away the health of a fellow-citizen, the health of a family, and perhaps the health of an unborn generation, escapes punishment at the hands of the law. It seems anomalous that there should be legislation against one of these things and not against the other. I am also in hearty accord with the proposal to legislate for the severe punishment of any one who, not being a qualified medical practitioner, undertakes to treat sufferers from venereal diseases. We Maori people have had much legislation passed in the interests of our health and welfare, but too often the dispensers of that legislation seem to have been more concerned about the mote in their neighbour's eye than the beam in their own. We have certain people who practise amongst the Maoris, known as tohungas. In the old days the tohunga was the man of knowledge in a tribe. He was the repository of the lore and learning of the tribe; and he was the priest, skilled in prescribing various remedies and in performing incantations. Many of the troubles and afflictions of the Maoris of those days were mental troubles, and were removed by the appropriate incantations. In the present day the tohungas have added to their knowledge through the enlightenment of civilization, and have become ordinary quacks—they have followed the Europeans even in that. In some districts they have done incalculable harm. A beneficent Government, recognizing the evil, brought in legislation to suppress the tohungas—to prohibit, in fact, unqualified people from treating disease amongst the Maoris. Now, I think it is necessary that a dose of the same medicine should be applied to Europeans; and I shall, in the matter of legislation, give my hearty support to any movement in that direction. However, I hope that, whatever course this Congress decides upon, it will not wait for politicians to carry it into effect. A politician only responds to the pressure brought to bear upon him, especially just before election-time. It is necessary to any active campaign on this question that it should be started by the medical profession, and my experience shows me that the more noise you make the more you will get in the way of legislation. I am sure we are grateful for what we have heard to-day, and I can only hope that the deliberations of the Congress will result in the lessening of unfitness and misery, and adding to the sum of human efficiency and happiness.

Dr. P. FIASCHI (Sydney): It was only while we were at sea on the way to New Zealand that I was informed that I had been made a representative of New South Wales at this Congress with Dr. Worrall. Had I known earlier, I would have brought with me interesting figures relating to my own practice in Sydney, especially with regard to gonorrhoea. I wish to express my appreciation of the work which has been done by the New Zealand Committee. Their inquiry on this subject, as I have reason to know from what came under my notice at a friend's house, has involved a very large amount of work. I am very pleased to find that gonorrhoea has been included with syphilis in the scope of the action to be taken, because it is my belief that gonorrhoea is much more devastating in its effect than syphilis in the first generation, though, as Professor Fournier said to me in Paris three years ago, the study of secondary syphilis has only just begun. Taking the number of primary infections reported by the New Zealand practitioners, I should say that it shows the necessity for applying free ultra-microscopic examination to all cases. When 1,288 primary infections have been diagnosed, we can imagine how many more must have escaped notice. It is the practice of my father and myself to examine with the ultra-microscope every lesion of the genitals that comes under our notice, and we sometimes find most innocent-looking lesions holding the *Spirochaete*. Probably among the 1,288 infections reported as primary there are some which are not primary. I venture to suggest that too much reliance should not be placed upon the Wassermann test, for in its application the personal equation is an important factor. Much has been said in the reports about salvarsan, but I do not think too much reliance should be placed upon salvarsan. It has been before us for only four years, while mercury has been in use in connection with these diseases since 1497. One has only to read Jean de Vigo, who wrote before 1500, to learn that he then considered it a sovereign remedy for syphilis. It is unwise to discard a drug that has been in use for five hundred years in favour of another until the utility of that other has been established. Many people believe that salvarsan is what Professor Fournier declared to be iodide of potash. Salvarsan is an effacer, but is not curative. It is a delusion to suppose that it has an abortive effect. I believe there is still necessity for maintaining the treatment that Professor Fournier has laid down. Gosher has now lengthened the period for intermittent treatment of syphilis to six years, and as Gosher is the leader of syphilology in France I do not think we can afford to disregard the opinion of a man of his standing. With regard to general paralysis, I do not think we can lay it down that syphilis is absolutely the cause of general paralysis. We have to bear in mind the increased strenuousness of life in the last twenty years. Our modes of communication are much more rapid than they were, and there is much more strenuousness on the part of all classes. That, undoubtedly, has been an important factor in assisting to bring about cases of general paralysis. My ideas as regards prophylaxis are expressed in the suggestion contained in the resolution as to the education of the public on this subject—their education by medical men. But while we are talking about educating the public we might as well at the same time put our own house in order. I consider that every medical school should have a Chair of venereal diseases. We must bear in mind that syphilis is one of the diseases in the study of which the greatest amount of progress has been made in the last few years. But is there a medical school in Australia or New Zealand which has a separate Chair of venereal diseases? In America and in Europe every such school has its Chair of venereal diseases, and it is largely to the work of such schools as those of Paris, Berlin, Vienna, and Budapest that we owe the large amount of knowledge we have on the subject. Personally, I am in accord with the plan adopted in Melbourne of having venereal clinics attached to the hospitals. I was connected for seven years with clinics for venereal diseases in New York—with one for three years, and with the other for four years. One was a night clinic, and the number of cases dealt with by us on a cold night would range from sixty to eighty, while on a fine night there would be from 140 to 180 cases, showing that when men can get an opportunity for treatment without losing time they will seek treatment. I was told when in Paris that one such institution there has been very largely patronized. I must be excused for the fragmentary nature of my remarks, and shall say no more than express my thanks to the Committee for the work they have done, and also my thanks to Dr. Barrett, to whom we are all under obligations for the energy he has shown in the matter.

Dr. J. M. MASON (Wellington): Like the previous speakers, I think we all owe a debt of gratitude to Dr. Collins and the members of the Committee, and especially to its secretary, for drawing up the present report. I trust that such criticism as I may offer against the report will be taken in the spirit in which I give it. We have heard a great deal about the prevalence of syphilis, but I put it to the Committee that if I were counsel for the other side I could take the data they give and be able to prove that if up to the present no legislation has been required on this subject none is now required. If we turn to the table in the report, and look at the column marked "No. 4," giving the answers obtained in New Zealand to the question "Is syphilis common in your district?" we see that eleven practitioners answered "Yes" and 265 said "No." If we turn to the next column, containing answers to the question "Is it more common than in years past?" we see that ten said "Yes" and seventy-nine said "No." Again, as to the inquiry whether the individual cases are of a more severe or of a milder type than in past years, fifty-six state that the cases are milder and five that the cases are more severe. If, therefore, we were to confine our attention to the data supplied by the report of the Committee, we must come to the conclusion which long ago I stated to be the true one—namely, that syphilis is not nearly so prevalent, at any rate in New Zealand, as some of the writers and speakers make out. Having pointed out this fact, I should like to say that although the disease is not so rampant as some of the speakers have tried to make it out to be, it probably causes more illness, both mental and physical, but more especially mental disease, than any other ailment to which human flesh is heir. But when one speaker—I think it was Dr. Barrett—suggested that syphilis was as common as tuberculosis, I thought he must be referring to some other country than New Zealand.

Dr. BARRETT: What I pointed out was that you wanted to know how far syphilis underlay tuberculosis.

Dr. MASON: I take it that any legislation we suggest, or any other suggestions we lay before the various Governments, must have for their basis the fact that the public are being injured. It is not suggested for a moment that a man in an advanced state of locomotor ataxia can possibly infect any one, because long before his case has become pronounced he usually ceases to be able to do anything in that particular direction. I think the resolutions submitted by the Committee are admirable, except that they require some slight modification. For instance, if syphilis is made a notifiable disease there can be no election on the part of the practitioner. He must notify. No official can excuse the medical attendant's non-notification. The matter cannot be left to the option of the individual. While I am of opinion that syphilis should be a notifiable disease, I think there should be some reservation whereby the notice could be sent without the identity of the sufferer being disclosed. With resolution No. 2 of the Committee I think no one can take exception. With regard to No. 3, as to free treatment in the public hospitals and dispensaries for syphilitics, I take it that the Committee mean to restrict the benefit to those who are unable to pay for help elsewhere. There is no reason why, because a man happens to be afflicted with syphilis, that qualification alone should entitle him to be entertained at the expense of the State. No. 4 has my entire approbation, and I think No. 5 must appeal to all of us. One great difficulty in framing legislation as to unqualified persons is that of hitting a particular kind of dog without interfering with the freedom of other dogs; but I think that adequate provision can be made. With regard to the proposal in clause 3 of the " revised edition " for provision of " free treatment, both in- and outdoor, at times convenient to the patients, for all those who are unable to make their own arrangements," I take it that that provision is meant to be restricted to persons unable to pay for treatment, but that that should be made clear.

Dr. COLLINS: It means free treatment for those who cannot afford to pay for treatment.

Dr. MASON: That may be the intention, but it is not the only interpretation that would necessarily be put upon the paragraph.

Dr. WORRALL: What is the position? I understood that Dr. Collins withdrew his proposed resolution, and that what is before the meeting is the " revised edition " brought forward by Dr. Barrett, which I seconded.

Dr. COLLINS: Dr. Barrett seconded my motion for the adoption of the report, and afterwards I seconded the motion for the adoption of the memorandum and resolutions which he submitted, in order that the two might go to the Governments together.

Dr. WORRALL: And which of the two is to have precedence?

Dr. COLLINS: The Governments would consider both.

Dr. MASON: With the " revised edition " of the resolutions I am in entire accord. It covers the whole field, and prevents any possible dubiety as to the interpretation of this particular portion, which I think is of great importance to the profession, unless we are agreed that because a man may have done wrong he is to be placed in a better position as regards treatment than the man who has not.

Dr. WORRALL (Sydney): It is only fair to state that Dr. Fiaschi and I are substitutes for colleagues who were to have represented New South Wales at this Congress but who were unable at the last moment to get away. Therefore we have not come as well fortified with statistics as we would otherwise have been. In listening to the remarks of Professor Colquhoun I could not help respecting his transparent sincerity and his lofty motives. Nevertheless, I must say that his policy is the policy of the ostrich and the giraffe. In opposing the first of the revised resolutions, with regard to the education of the public, he strikes at the kernel of the proposals. If people are not alive to the dangers which threaten them, how can they be led to take precautions against those dangers? Objection has been taken to the " penalties " by which it is proposed to abolish the present evils. Well, the keynote of Dr. Barrett's proposals is that there is no penalty: we are against compulsory notification. It is worth noting that in the cable news published in to-day's newspapers it is reported that the Labour Congress of New South Wales has, by seventy-two votes to ten, carried a resolution in favour of "the compulsory notification of venereal diseases, the provision of dispensaries, systematic examination, and free distribution of certain remedies by the hospitals." That goes to show that the labour representatives have become alive to the seriousness of the disease. But I feel very strongly that public opinion is not prepared for compulsory notification, and therefore we should at present have nothing to do with it. The effect of compulsory notification would be to deter the people from coming up for diagnosis and treatment at the early period in the development of the disease, when it is so essential if the treatment is to be effective. It would mean that those people would be thrown into the hands of the advertising person and the "women's colleges of health," which have already done so much harm. I have heard much about the way in which chemists bleed the medical profession, and we know that in this matter many of them arrogate to themselves work for which they have no training, and in endeavouring to carry it out they are inflicting injury upon the community. When I remember that, and in going down the streets of Auckland I see the names of doctors outside the doors of chemists' shops, I cannot help marvelling at the extraordinary action of the profession in giving these men a status to which they have no claim. If I were a practitioner in Auckland I would get up an agitation to boycott every chemist who undertook work for which he had had no training, and would arrange for the establishment of a co-operative dispensary, which would deal with prescriptions in cipher, and would make the chemists look to themselves. The vested interests of the chemists are not to be considered in this matter. Any system of notification of the disease would undoubtedly deter people from coming to the profession for treatment, and throw them into the hands of the quack. For a similar reason I endorse the proposal that no distinctive name should be given to the ward or the hospital in which this class of cases is treated. There should be no such thing as a lock ward or hospital, and cases of this description should be treated with the same consideration and the same sympathy as any other class of cases. With regard to the New South Wales Police Act, everybody must approve of the detention of prisoners who are suffering from any disease which is dangerous to the community; but the very next provision in that Act does as much harm as the detention of the infected prisoners does good. I refer to the provision with regard to brothels. Incidentally, that provision has caused an increase in "graft" on the part of the police to an extent that was unknown before. It has also led to the spread of venereal disease. Many of the women who kept brothels were intelligent enough to recognize that it was to their own interests to keep the inmates in health, and therefore to have them examined at intervals. Now that is changed, for the women are driven to take precautions to conceal their proceedings, and the effect is evil. I think it is now accepted by those who formerly opposed the idea that gonorrhoea should be placed in the same category as syphilis, and the same policy be applied to both. Coming to the proposal for the education of the public, I agree that education must precede every wise reform and every beneficent change, but I confess that I do not think that educating the people as to the consequences of their frailties will have any deterrent effect. It has never done so in the history of the world. In the Middle Ages women were burned alive and buried alive for lapses from virtue, and later on they suffered ostracism, a terrible picture of which we find in Hawthorne's story "The Scarlet Letter"; but still the trouble went on. There is only one part of the educational programme on this subject which has produced an immediate and striking effect, and that is educating the people as to the means of minimizing the effects. That is the provision which I am sorry to see that Professor Colquhoun opposes. I should say that the separation of the question of morality from the medical aspect of the matter is an important factor in attaining progress. Their non-separation has been a great hindrance to every proposal that has been made to check the ravages of this particular disease. Take the case of the Contagious Diseases Acts: Undoubtedly they did accomplish a great deal of good. They were not perfect, but instead of endeavouring to eliminate from them what was dangerous the bigots and zealots destroyed the system by the use of the catchwords "State regulation of vice." They forgot that the disease which the system controlled would continue, and that the only result of their agitation would be to leave the people unprotected. Now we are to be met with another parrot-cry—"What! Teach people to escape from the consequences of their sin! Make the way of the transgressor less hard! Monstrous!" Whilst I realize what licentiousness has done in the history of the world—how it has destroyed nations—I recognize also that bigotry and intolerance have never improved the world. We have to remember the wave of licentiousness that swept over England in the reaction after the Cromwellian regime. And so it has been at other periods. We are wise in removing from the paths of the people everything that is suggestive, such as suggestive post-cards and the like, and in keeping the sexual element in their nature dormant as long as possible. If there is a lapse from virtue, let us not view it with harshness. Sexuality has been implanted in our nature by the Creator for the wisest purposes, and it is closely related to the highest attributes of our nature—the love of wife, of child, and of home. It is only by regarding the matter in this liberal and broad-minded spirit that we shall be able to take adequate measures to prevent the spread of these great evils, which at the present time are practically unchecked.

Dr. GODFREY (Melbourne): I can only speak on this subject from the point of view of a worker in the hospitals for the insane. I can endorse a great deal of what has fallen from other speakers with regard to the ravages that result from this class of diseases—from syphilis more particularly. I have been surprised to hear what has been said by one speaker about the small incidence of syphilitic insanity in this Dominion, because it shows a remarkable contrast with what we have experienced in Victoria. A very careful compilation of statistics has been carried out there, and we find that not less than from 8 to 10 per cent. of the admissions into the hospitals for the insane there are general paralytics. Perhaps we put undue reliance upon the Wassermann test, but in every case which has been tested in the last two years which gave a positive Wassermann reaction, and in which the patient has ultimately succumbed, the post-mortem examination has shown the classical microscopic appearances of the disease; while in every case, without one exception, in which a patient suspected of general paralysis has died, but in which the Wassermann reaction had been negative, we have found that the post-mortem conditions were not those of general paralysis. I think we are entitled to recognize that syphilis is responsible for an enormous amount of mental disease in our community. We found also, by taking the blood-tests of the patients in the idiot asylum at Kew, that in something like 40 per cent. of the idiots and imbeciles, excluding those whose condition was attributable to trauma before or during birth, the blood-test gave a positive reaction. I would go as far as to say that if we stamp out syphilis we can reduce the number of inmates of our asylums by at least one-fourth. I would say, " No syphilis, no general paralysis ; no syphilis, and a considerable diminution of idiocy and epilepsy." As I did not know that I would be a speaker this afternoon, I have not fortified myself with figures to further emphasize my views, but I shall give the proposals now before the Congress my whole-hearted support.

Dr. ROBERTON (Auckland) : Do I understand that Professor Colquhoun has suggested an amendment of the proposed resolutions ?

Professor COLQUHOUN : I said I would agree to the resolutions if No. 1 were altered. I do not think any suggestion as to the mode of prevention of venereal diseases should come from such an assemblage as this.

Dr. ROBERTON : I also would support an amendment of that clause. I do not feel satisfied that it is wise to carry the clause as it stands. In dealing with such matters as have been introduced by Dr. Barrett and Dr. Worrall we should be ruled by common-sense, and I think that any proposal to teach adolescents anything about venereal diseases is wanting in common-sense. Dr. Worrall himself mentioned just now the ill effects of suggestive post-cards and pictures, and yet he is proposing to keep prurient matter before the minds of the public in a still more prominent manner. The question of what should or should not be taught to adolescents on this subject has very seriously engaged the attention of those concerned in both primary and secondary education. I can speak from personal knowledge with regard to the conductors of secondary schools in this part of New Zealand, and can say that they are unanimously of opinion that while in many instances instruction is absolutely necessary, yet any general attempt to instruct adolescents in sexual matters can only result in extreme danger to the average child. I do not want to see clause 1 eliminated, because education is the main influence to be relied upon for the stamping-out of venereal diseases. Here I join issue with some of the previous speakers. I think that Dr. Worrall, in stating that certain measures taken to oppose the Contagious Diseases Act were due to bigotry, entirely misconstrued the attitude which conscientious people who are not bigots have taken up. I should like to see the clause retained, but altered to something more in accord with common-sense.

Dr. HARVEY SUTTON (Melbourne) : As a member of the Committee which deals with the question of syphilis in Victoria, and also as a school medical officer, I have had some experience on the question of education. It may be that I am wanting in common-sense, but I shall detail my experience. Some time ago the students at a training college, backed up by their principal, asked me to give them definite instruction in sex hygiene and on the question of venereal disease. The ages of these men would range from sixteen to nineteen years. I think the information I gave them was received in all seriousness, and I know that the principal of the college was pleased with the course. The women teachers under the Education Department of Victoria also requested the Department to arrange for them a course of such instruction, and the teachers instructed would include the junior teachers, who entered the service at the age of sixteen or seventeen. I think it is a wise course to give instruction of the kind at such an age. It is being more and more realized that the most important age as regards infection is that of adolescence, owing probably to the presence of vigorous sex stimuli, uncontrolled by common-sense. The idea of conveying the information to adults alone seems to me like locking the stable-door when it may be too late. I also know that Dr. Bottomley, of Victoria, issued a pamphlet to young men under the auspices of the Australian Natives' Association. At the hands of a prudent person this information can be given without exciting prurient feelings. From the scientific point of view I object to a system of instruction in which physiology is cut short at the level of the ureters. I fail to see why a plain and simple statement as to the functions of organs of which every one is conscious should not be given, but, above all, it should be given by those who know. Not only do I think it is advisable that this instruction should be given by the profession, but I think it is our plain duty, and that it would be very reprehensible if we refused to give the public what, in Australia at least, I believe they are demanding should be given.

Professor COLQUHOUN : I should like to ask the last speaker a question. Did he instruct the boys of whom he has spoken as to the method of avoiding infection if they had illicit intercourse with women ?

Dr. SUTTON : No, because at that time the question had not been raised.

Another Speaker : Would Dr. Sutton do it now ?

Dr. SUTTON : In certain circumstances I think I would. In the case of students of a college to which I am attached I have gone to the extent of instructing them in the matter of prevention.

Dr. A. H. HALLEN : I have listened with great interest to the discussion and to the opinions expressed in favour of education on the subject of sexual dangers. When I was a newly qualified medical man I had an interesting experience which for me put that method on a proved basis. It was a time when " pogroms " in Russia and anti-Jewish riots in other parts of eastern Europe were causing a tide of Jewish emigration from those countries to Britain and America. The Jewish colony in East London became enormously swollen by a flood of pauper Jewish emigrants from Russia, Poland, Germany, and other States. It was my fortune to attend for some time at a dispensary in East London for this polyglot medley. I noted as an extraordinary fact that venereal diseases were most uncommon among them, and that the standard of sexual morals in women was very much higher than among the other classes living in their part of the city, and probably than that of the countries of their origin. They certainly had all the temptations of poverty, many being clad in picturesque but filthy national garments, each of his or her own place of origin, their covering being, indeed, their only personal possession in the world. No doubt circumcision would suggest itself to some of you, but I have not gathered that that operation exerts a marked restraining effect on the sophisticated Jew, however it may be believed to reduce his liability to infection. My inquiries drew information that the absolute moral sexual superiority of these people was due directly to the fact that at puberty it is the custom for the parents, assisted by the rabbi, to put their children through a prescribed form of instruction or catechizing elaborated on an ancient basis which antedates by hundreds of years the foundation of Christianity. I cannot doubt that Christian peoples could adopt this system with material advantage in the reduction of venereal diseases, prostitution, and their complex social and racial injuries. But there is another favourable factor among these people which deserves notice—I mean the prevalence of early marriages. I am quite surprised that this matter has no place in the recommendations of the Committee. To my mind, at least, the question of the incidence of the age of marriage has a fundamental relationship to the question of prostitution. And the advancement of the age of marriage is not of social but of political origin, and is closely related to the incidence of taxation and the cost of living. Under our present conditions of protection and high wages, to be a single wage-earner is to have a fine time and plenty of money to spend in cheap amusement and personal caprice, while to be a married man and father of a family is to bear an unduly heavy burden of public debt and private harassment. I think it is the sacred duty of the profession to point out this elemental fact to the Governments who may consult us, because, however distasteful that lesson may be, it deals with the one aspect that a Government can materially and directly modify.

Dr. ROBERTON : May I move a definite amendment to clause 1 of the "revised edition"? I would propose to make the clause read, "The provision (after consultation with educational experts as to the lines to be followed) of education for adults and adolescents in the nature, causes, consequences, and mode of prevention of venereal disease." I think this amendment will remove a great deal of objection. Consultation with the educational authorities should always take place in a matter of this kind.

Dr. BARRETT : I will accept that amendment.

Professor COLQUHOUN : And I have great pleasure in seconding it. It is a pleasure to arrive at common ground upon which I can agree with Dr. Barrett.

Dr. BARRETT : Before this resolution is put to the meeting I would like to read again the Press telegram from Sydney which has already been alluded to. We have arrived at a parting of the ways. We have tried honestly to face the position this afternoon, and to devise a course to be followed. I want to see the medical profession controlling this movement when it is developed, and not appearing in a belated way to manage proposals which have got out of hand. This is the telegram from Sydney relating to the action of the New South Wales Labour Conference : "A motion was carried, by seventy-two votes to ten, for the compulsory notification of venereal diseases, the provision of dispensaries, systematic examination, and free distribution of certain remedies by the hospitals." From that we see that the populace is moving. The people are beginning to understand. The time has come for the profession to give sensible guidance to the movement, and it is a matter for congratulation that we shall be able to pass these resolutions this afternoon, and remit the consideration of the principles to the respective Governments and the branches of the British Medical Association, so that in each State the matter shall be handled temperately and quietly, and nothing shall be done except after consultation between the statesmen and the men of science.

Dr. HENLEY (Napier) : We have been told by one of the speakers that it is eighteen years since this question was brought up. What have we in New Zealand done during those eighteen years? Not very much.

I am afraid. The tendency of a certain section of the Congress seems to be to go upon what Dr. Worrall and Dr. Buck have spoken of as the ostrich policy. Unfortunately, I am afraid, we are hampered to some extent by British instincts. The average citizen likes to be thought a highly virtuous individual, and to look with holy horror at the imperfections of his neighbours. But when the public are suffering from venereal disease to the extent that has been shown to-day it is incumbent upon us to take action. I take it that we should go to the public with the present report, and no feelings of squeamishness should be allowed to enter into the matter. There should be no hypocrisy or humbug about it.

Dr. Collins: I think this is the first Congress in which the medical profession have urged the necessity of coming right out and thrusting this matter before the public, who really, up to the present, have shown no interest in it.

The report of the Special Committee on Syphilis was then adopted.

Dr. Roberton's amendment to clause I of the resolutions in the "revised edition" was also agreed to, and the motion for the adoption of those resolutions as thus amended was adopted.

Dr. Collins expressed the gratitude of the New Zealand members of the Committee to its secretary, Dr. Hardie Neil, for the very valuable work which he had done in connection with the report.

It was resolved at a general meeting of Congress that the Special Committee's Report on Syphilis and the additional memorandum submitted by the Australian delegates be adopted, and that they be published and submitted to the various Governments and bodies interested.

It was also resolved that a permanent Commission on Venereal Diseases be appointed by Congress to guide the arrangements for the production of the special report, and to act as an advisory body to the Executive of Congress. The following were appointed: Chairman, Dr. W. E. Collins (Wellington); Victoria—Dr. W. J. Barrett, C.M.G., Dr. Robertson, Sir H. B. Allen; South Australia—Dr. Newland, Dr. Poulton, Dr. Martin; Tasmania—Dr. Sprott, Hon. G. Butler, Dr. Hogg; New South Wales—Dr. Worrall, Dr. Molesworth, Dr. P. Fiaschi; New Zealand—Dr. W. E. Collins, Professor Colquhoun, Dr. A. Challinor Purchas, Dr. Hardie Neil; South Sea Islands—Hon. G. W. Lynch, Suva; Queensland—Dr. S. Lockhart Gibson, Dr. Turner, Dr. Espie Dodds; Western Australia—Dr. Atkinson, Dr. Ramsay, Dr. Pope Seed; General Secretary—Dr. Hardie Neil (Auckland).

SECTION OF MEDICINE.

RECENT ADVANCES IN THE DIAGNOSIS, PROGNOSIS, AND TREATMENT OF CARDIAC DISEASE.

By H. Hume Turnbull.

Our first adequate conception of the mode of beat of the heart we owe chiefly to Gaskell and Engelmann, and since their time a great deal of physiological knowledge has been awaiting application. Mackenzie took up the question, and worked at it for many years, but was thwarted in the application of his work by a want of clear knowledge of the anatomy of the human heart. The work of Kent, His, jun., Keith and Flack, and Aschoff and Tawara, enabled them to give a much more complete picture of the normal method of heart-beat in man and of disorders of cardiac function.

As a result of the work of these and later observers we know that the tissue of the primitive cardiac-tube persists in the mammalian heart, being covered by the ordinary muscle-tissue in great part, but in places persisting in masses in certain specialized areas. Of these, the important seem to be the sino-auricular node at the cavo-auricular junction, and the auriculo-ventricular node of Tawara in the vicinity of the coronary sinus. Some other remnants have been found in the auricular walls, but their special significance is doubtful. The tissues uniting auricle and ventricle, which are apparently part of the same system, are gathered into the auriculo-ventricular bundle of His. This commences at the auriculo-ventricular node at the posterior and right border of the interauricular septum, and runs almost horizontally forwards and to the left, ensheathed and isolated in a fibrous canal, along the right of the central fibrous body of the heart to the pars membranacea septi of the ventricle, at the anterior part of which it divides. The left division perforates the membrane, and enters the subendocardial space of the left ventricle, and runs downwards under the endocardium of the septum, where it begins its arborization, and the main branches flow to the papillary muscles of the mitral valve. The right branch passes down the right side of the septum under the endocardium, enters the moderator band or its representative, and proceeds directly to the papillary muscles, where it commences its arborization. The arborization on both sides is directly continuous with the extensive and complex network of Purkinje fibres, which lines the greater part of the interior of both ventricles. From this network direct communication with the ventricular muscle-fibres takes place. There is apparently no path connecting the sino-auricular node with the auriculo-ventricular, the impulse spreading through the contracting auricle; but impulses from the auricle to the ventricle are able to pass only through the bundle, there being no other functional union between auricle and ventricle.

Note.—The anatomical description is taken almost entirely from Lewis's "Mechanism of the Heart-beat."

Mackenzie applied the knowledge gained from physiological and anatomical sources to the study of the human heart, and the publication of his book on " Diseases of the Heart " marks the first great step in the recent revival of interest in the accurate clinical study of the heart's action in health and disease. Of course, a great deal of work had been done, both in England and other countries, before this time, but this book was the first attempt to give a complete account of cardiac disease based upon an appreciation of normal cardiac function, and the importance to the organism of any disordered function of cardiac muscle.

Since that time an army of workers all over the world has been busy at the problems involved, and great advances in our knowledge have been made.

Mackenzie directs attention in the study of cases to two great points, of which he insists that the first is the all-essential.

(1.) The endeavour to ascertain what amount of reserve power for work the patient's heart retains.

The chief difficulty here is that there is no standard, for each man differs from his neighbour in physical powers, even when in good health; but most men know fairly well what their normal capacity was, and a careful study will usually show any limitation.

If a healthy heart be regularly overworked, or a heart possessing some defect limiting its power be worked enough to overtax its strength, however light that work may be, symptoms appear which are noticeable to the individual himself, and which may take many forms—*e.g.*, breathlessness, pain, oppression in the chest, feeling of suffocation, &c.—and it is of supreme importance to recognize that these symptoms are the first indication of an overtaxed heart, and appear long before obvious objective signs appear.

It may be that the work in itself is not too hard, but that the rest obtained is insufficient, or other removable causes of fatigue may be present. These will usually be revealed by a careful inquiry, directed especially towards the first symptoms noticed, and the time of their occurrence.

The point is that any failure of cardiac muscle is first revealed by subjective symptoms and shown by a diminished reserve of power, and in the absence of any efficient test the thorough and careful weighing of the subjective symptoms presented by any patient gives the clue to the condition of his heart-muscle more readily than any physical examination can do.

(2.) The necessity for a thorough recognition of the various types of irregularity, as a preliminary to the attempt to estimate the importance of each.

The introduction of such a simple method of study as the ink polygraph provides, placed in the hands of all who were interested in the matter a means of determining what type of irregularity was present in any given case.

The vast majority of irregular hearts fall into some six simple categories, and these had been carefully studied by Mackenzie; but in a few cases complex curves baffled complete analysis, and it was recognized that a more accurate and delicate method was required to supply the necessary information in these cases. This soon appeared in the form of the string galvanometer, as introduced by Einthoven, and since its appearance an immensity of work has been done with this instrument, and many problems have been or are being solved. Most of the rhythms which could not be analysed by the polygraph have now been studied and their nature revealed by the electro-cardiograph, and with a very few exceptions indeed it is possible now to classify any given case of irregularity into its proper category, and to locate the foci of origin and the paths of the abnormal stimulus or the alterations in conduction paths which bring about the variations in beat.

Of course, the grosser forms of heart-block have been thoroughly recognized for many years, but the modern instruments of precision allow us to recognize even slight alterations in conductivity, and with the electro-cardiograph we can recognize lesions in either of the main divisions of the bundle of His.

Laborious experiments have been undertaken in the endeavour to reproduce in animals similar states of arrhythmia to those which are found in man, with conspicuous success; and as curves taken from these animals show that the venous and radial curves and also the electric complexes found in such disordered states in man can be reproduced absolutely in the experimental animal, it is a fair assumption that the broad morphological conditions at least—*i.e.*, the site of the lesions—are similar.

I shall now pass to a consideration of heart-diseases in the light of the results obtained by such accurate study.

The necessity of a clear understanding as to what is meant by "heart-disease" is well shown by the publication (*vide* Melbourne *Argus*, 23rd December, 1913) of figures showing that among six million children medically examined in London 35 per cent. were said to be suffering from heart-disease.

Such a statement as this shows that there is something very wrong with the standard adopted, and many normal children have undoubtedly been included among the diseased. A more thorough and careful study of the actual circulatory condition of people who live normal lives and show no signs of cardiac embarrassment has revealed the fact that murmurs and irregularities of certain types are no more abnormal than red hair or large feet.

Thayer (34) examined 218 healthy people, and found an apical systolic murmur present in the recumbent position in 56 per cent. of those from three to ten years of age, 35 per cent. in the second decade, 21 per cent. in the third, and 19 per cent. in the fourth decade. Of thirty robust boys at school, eighteen showed murmurs of various sorts. Variations in heart-size are also very frequent, as is to be expected. The theoretical normal is only an average, and wide deviations may be present in healthy people—a fact which has only lately become generally accepted.

The "youthful irregularity" of Mackenzie is a form of arrhythmia in which alterations in the length of the diastolic pause occur in a phasic manner, the phases being frequently dependent on respiration, the length of the diastolic pause usually increasing in expiration and decreasing in inspiration. This condition is so common as to be almost universal in childhood and adolescence, and it has frequently been looked on with suspicion or treated as a serious disease.

These cases, when the arrhythmia is very marked, have been refused for life insurance, the physician failing to recognize the type of arrhythmia; but an even more serious state of things may be brought about by a guarded prognosis being given to those cases of vaso-motor instability, who commonly present this sign. These patients are usually convinced that they have heart-disease, and are rather loath to give up the idea, so that an indefinite or serious opinion from one physician is extremely liable to increase their neurosis, and make it almost impossible to satisfy them as to the harmlessness of their condition.

Sinus arrhythmia is of importance also, because it appears so very commonly after acute diseases—rheumatism, diphtheria, &c.—and if not recognized may give rise to great and needless apprehension. There may here be some little difficulty, in the absence of graphic records, in determining whether sinus arrhythmia or partial heart-block is present, but as a rule attention to the phasic character of the arrhythmia and its relation to respiration will make all clear. If any doubt remains it is of the utmost importance to have it cleared up at an early date by the use of graphic methods.

The recognition of the premature systole or "extrasystole" is very simple, even without graphic methods, though these are necessary to determine in what portion of the cardiac musculature the ectopic beats arise. There is still much discussion and some doubt as to the significance of extrasystoles. On the one hand, it is argued that the normal heart does not present them, and they are a sign of disease; on the other hand, a very small sclerosed focus may certainly suffice to give rise to ectopic stimuli and to extrasystoles, and a great volume of clinical evidence shows that patients presenting even large numbers of such premature beats may live long and active, even strenuous, lives without presenting any sign of cardiac inadequacy. Therefore it seems better that, provided a careful and thorough inquiry in such a case reveals no limitation of the cardiac field of response to effort, no cause of intoxication—*e.g.*, recent infectious disease, or an infective focus somewhere in the body—nor any chronic poisoning, such as tobacco excess, digitalis, &c., the irregularity should be neglected in the prognosis and the patient either not told of it, or, if he is already aware of the abnormality, reassured as to its harmlessness. The problem is different in acute disease or in chronic intoxications, and these will be discussed later.

In cases presenting extrasystoles, as in all other cases of cardiac weakness, particularly when there is a loss of vaso-motor tone, it is extremely important to search carefully for any focus from which toxines may be being absorbed. Common sites for such foci are the gall-bladder, the ethmoid cells, the tonsils, mouth, and nasopharynx, and probably also the pelvic organs in women; and no examination is complete which does not include a search for the cause of the original heart weakness. Often this is obvious enough, but some hidden focus is not infrequently unearthed, and its thorough treatment alters an apparently incurable condition into one which yields readily and sometimes wonderfully quickly to treatment along simple rational lines. I am especially impressed with the importance of an infected gall-bladder and of infected ethmoid cells as causes of cardiac degeneration.

Lewis has shown that experimentally if a stimulus be applied to a point in the auricular cardiac musculature in increasing force or for a prolonged period it may at first set up single extrasystoles, later auricular tachycardia, and finally fibrillation of the auricles; and he has also shown that such a sequence may be followed in some clinical cases. Thus it is probable that a single focus of myocardial change may at first cause only occasional extrasystoles, and later the more complex irregularities may be set up by a continuance of the stimulation. If this sequence were always followed, it would much increase the significance of the extrasystole, as, in at least a percentage of cases, such a course might be expected.

It is hardly necessary to point out that if this were the case ventricular extrasystoles would be even more threatening than auricular, as more than a very short period of ventricular fibrillation is incompatible with life. However, we have reason to believe that such a series of events is unusual, though paroxysmal tachycardia usually occurs in hearts which present single ectopic beats during the slow period, arising from the same point of the muscle as the beats of the paroxysm do. Still, an immense proportion of cases showing extrasystoles do not have paroxysms of tachycardia, and in the vast majority of cases of auricular fibrillation there is no evidence that the patient ever suffered from paroxysmal tachycardia. In auricular flutter, which is practically an auricular tachycardia, with partial heart-block, the flutter frequently under treatment passes into fibrillation.

The evidence at our disposal therefore seems to show that only a very small percentage at most of the cases which show extrasystoles are likely to go on to the more serious disorders. Still, these considerations should be remembered, and it is in the highest degree desirable that all physicians, especially general practitioners, who are better able than hospital physicians to watch their cases over long terms of years, should aid in gathering the material which would enable us to decide whether any, and if so which, extrasystoles are to be regarded as of serious import.

The increased attention given to irregularities has shown that true paroxysmal tachycardia is much commoner than was formerly thought, and may occur at intervals over many years without the patient being much the worse. In any case, where a patient complains of palpitation it is very important to determine whether the condition is one of true paroxysmal tachycardia, due to impulses arising in an abnormal focus in the musculature, or is a simple increase of rate due usually to some nervous cause, or, again, is merely dependent on a hypersensibility, the heart-beat becoming unpleasantly obvious to the patient, though the rate is little if at all increased. Occasionally a patient may complain of palpitation when he is conscious of a premature contraction, either the long pause after the beat or the next large thumping beat being at times felt, and causing apprehension.

If the patient be seen in an attack, and tracings be taken, the diagnosis is simple; but often one has to depend on the history, and one of the most important points is the recognition of the fact that in true paroxysms the onset and offset are both sudden, the rate increasing in the course of two successive beats from normal to that of the paroxysm, while at the offset, after a post-paroxysmal pause of varying length, the normal rate is abruptly resumed. In simple palpitation, on the other hand, the increase in rate is gradual and the condition passes off gradually, so that the patient is usually unable to state that there was a definite recognizable moment at which the attack ceased.

The prognosis in paroxysmal tachycardia is a little uncertain, as we do not yet know the true pathological basis underlying the condition, but it is exceptional for an attack to end in death, though this is not unknown. The gravity of any particular attack depends on the reaction of the heart-muscle to increase in rate. If the patient is comfortable during the attack, even though he may be conscious of it and feel inclined to lie up, there is little cause for apprehension. Often he is able to get about and continue his business for some time, and in some cases in which short attacks are frequent he fails to recognize their presence. On the other hand, when the heart dilates considerably, and the patient becomes cyanosed, orthopnoeic, and even dropsical, and these conditions increase as the attack continues, prognosis is grave, and, unless the attack comes to an end in at most three or four days, death is probable.

No satisfactory method of stopping a paroxysm has yet been found. All sorts of manoeuvres are resorted to successfully by patients, but usually the manoeuvre which will stop the attack in one patient fails in another, and even in the same patient what will stop one attack may fail in another. Most of the manoeuvres resorted to—*e.g.*, administration of digitalis, swallowing various fluids, production of emesis, &c.—have as their objective, or at least as a probable result, the starting of a vagal stimulus strong enough to arrest the activity of the abnormal stimulus-producing centre for a sufficiently lengthy period to allow the normal centre to take up its work again, with the hope that the normal rhythm may then continue instead of the pathological. Following up this reasoning, efforts have been made to produce the same result by direct mechanical stimulation of the vagus in the neck, and with fair success. A good deal of experimental work has been done in the last few years on the results obtained by vagal stimulation, and Canby, Robinson, and Draper (30), and later and more thoroughly A. E. Cohn (5, 6), have worked at this subject both by direct stimulation of the nerves in dogs, and by mechanical stimulation by pressure on the carotid sheath in man.

Cohn concludes that there is usually a great qualitative difference in the action of the two vagus nerves on the heart of the dog, stimulation of the right nerve usually causing arrest of all chambers of the heart, while stimulation of the left profoundly affects the conduction of impulses over the auriculo-ventricular system, making it more difficult for them to pass, and produces all degrees of effect from a simple prolongation of the p–r interval to complete dissociation. He explains the different actions as being probably dependent on a different anatomical distribution of nerve-endings, those from the right nerve being chiefly supplied to the auricle, and especially the sino-auricular node, while the left vagus has a ventricular or atrio-ventricular distribution.

In one or two experiments the results of vagal stimulation were transposed, the right acting like the usual left, and *vice versa*. In man, somewhat similar but rather less definite results have been obtained (6, 28).

The suggestion is therefore made that the right vagus may be of value in controlling or stopping paroxysms of tachycardia arising in the auricle, and in a few patients this idea has been found to be the case; but the manoeuvre is frequently unsuccessful, and anomalous results may be obtained.

In Cohn's experiments the removal of the sino-auricular node usually rendered the right vagus inactive in controlling the rate of the auricle, and this may be the reason why it so often fails in pathological cases where the auricle is responding to stimuli arising from a point other than the node. Stimulation of the left vagus seems to give more consistent results, and in many cases, where there is some impairment of conduction in the bundle, stimulation here will further increase this, till some of the auricular impulses fail to get through and the corresponding ventricular beats are dropped.

This may be of help in the diagnosis of auricular flutter, a condition in which the auricle is responding to ectopic stimuli at a considerably enhanced rate—up to 300–400 per minute—while the ventricle responds to only some of the auricular impulses. In these cases stimulation of the left vagus in the neck may further depress conductivity in the bundle system, and, while slowing the ventricle, allow the auricular beats to show out more clearly in the venous curves or electro-cardiogram. In auricular flutter, especially where the decrease of conductivity is considerable, surprisingly little disability may result; but in other cases, where either the ventricle responds to very many auricular impulses, or its muscle is markedly degenerated, there may be considerable and increasing heart-failure, with the usual signs of dilatation, dyspnoea, &c. Marked alternation of the radial pulse is common in these rapid cases. It has been shown (11, 31, 29) that vagus, especially right vagus, stimulation may cause auricular tachycardia set up in the experimental heart by faradization to become transformed into fibrillation. In all cases in which it has been tried, pressure on the vagus in the neck has failed to transform flutter into fibrillation in the auricles of the human heart, but such a transformation may occur under the influence of digitalis, an important part of the action of which is vagal stimulation. In cases of auricular flutter the earliest effect of digitalis is usually an increase in the block between auricle and ventricle; and later the flutter may give place to fibrillation of the auricles. If the digitalis be now stopped, and the patient kept at complete rest in bed, the fibrillation frequently ceases, and the normal rhythm is re-established, with stimulus production at the sino-auricular node. Thus in a considerable percentage of cases of flutter digitalis will bring about a complete and often apparently permanent reversion to the normal rhythm, but it must be used in full doses, and the patient kept at rest and under careful observation. If he be allowed to go about, the fibrillation seems liable to give place to flutter again instead of to the normal rhythm, and also important observations may be missed.

Perhaps the most important of all irregularities from the point of view of prognosis, and especially of treatment, is auricular fibrillation.

Mackenzie (18) had separated off and identified with more certainty than any previous worker a group of cases in which the pulse was completely irregular—the *pulsus irregularis perpetuus* of the Germans—and had shown that, though the auricle was certainly not quiescent, since in some of the cases in which the condition had lasted for years the auricular muscle was hypertrophied, there was no trace of auricular systole during the diastole of the ventricle. He was the first worker to show that the combination of completely irregular heart and "ventricular" venous pulse indicated a definite specific condition, and at first he regarded it as being due to paralysis of the auricle. This was disproved by the discovery of auricular hypertrophy in one such case, and finally he concluded that auricle and ventricle must beat together, and probably the exciting stimulus for both beats arose from a single point. On account of its situation between auricle and ventricle, he fixed on the node of Tawara as the most likely place, and classed this type of case under the heading of the "Nodal Rhythm" (20, 21, 22), a term which he made to include all cases in which the venous pulse was of the ventricular form—*i.e.*, in which no trace of an auricular wave could be found. Thus there was included a small subgroup of regular rapid tachycardias, which he recognized were dissimilar to the other members of the main group, and he admitted his inability to account at that time for this dissimilarity to the main group. The explanation was laid bare very shortly after the introduction of the electro-cardiograph by Rothberger and Winterberg (32) and by Thomas Lewis (14, 15), who, working separately, showed that the irregular heart with a ventricular venous pulse really results from a complete change in auricular function, the auricular muscle being in a state of very rapid inco-ordinate contraction of small muscular groups, the resulting irregular stimuli falling in showers on the upper end of the auriculo-ventricular conducting-tissue, and some of them passing along the bundle causing the ventricles to beat, co-ordinately certainly and in normal sequence, but in a completely irregular manner.

Many of the auricular movements fail to excite the ventricle, whose rate is rarely more than 180 per minute, while the auricular movements appear to be usually from 450–600 per minute. The small group of regular rapid hearts showing ventricular venous curves were found to be due to stimulus formation at a new place somewhere in the junctional tissues close to the node—*i.e.*, virtually a nodal rhythm (37). This fact is interesting as showing that there was nothing inherently improbable in Mackenzie's hypothesis, though the apparatus at his disposal was insufficient to show him the real facts. It is interesting to note that as long ago as 1906 Cushny and Edmunds (8) had called attention to the striking similarity between radial curves got from a patient showing the "mitral pulse" and those from a dog whose auricles were caused to fibrillate by faradization. Mackenzie was attracted by their observation, and also showed small irregular waves in the venous pulse during ventricular diastole, but he came to the conclusion that they were due to instrumental error, and adopted the nodal-rhythm theory as the more probably correct one.

Experimental and clinical studies in many lands and by many observers have now thoroughly re-established the fact that this form of irregularity is due to auricular fibrillation, the only proof lacking being a direct observation of the fibrillating auricle in a human being. Lewis has several times observed by direct inspection and demonstrated to others the fibrillating auricle in the horse, which is subject to this disorder. (16.) In cases in which this rhythm is present, a general view of the patient's symptoms and signs, with a view to arriving at a correct conclusion as to the state of his myocardium, is, of course, as important as in every other case, but the abnormal rhythm itself adds a feature of the utmost importance to the case. The throwing out of action of the auricle is probably of little or no importance, the alteration in ventricular rhythm being the essential thing. This is shown by the fact that where the ventricular rate remains below 80 per minute and the beats are mostly efficient ones, the patient may continue his occupation in almost perfect comfort for years, while if the ventricle beats very rapidly, and many beats are weak and inefficient, dilatation and failure soon set in. In many cases, especially in older people, the ventricular rate rises only to about 90–110. The patient continues comparatively comfortable, though probably with little reserve power, and the auricular fibrillation is discovered only by accident; though these old hearts with fibrillating auricles, once overstrained, fail to respond satisfactorily to treatment. Also in cases in which the fibrillation appears, disappears, and reappears at intervals, the patient may quite fail to recognize any change. In many cases, however, where the ventricular muscle is degenerate, or in which much of it has been damaged by rheumatic myocarditis, the added disability of auricular fibrillation is sufficient in a comparatively short time to cause the enfeebled muscle to give way, and the ventricles dilate, while the pulse-rate is quickened, and the usual signs of heart-failure gradually appear.

Where the pulse-rate is slow—75–90—and the patient comfortable, and able to work without disability, no treatment is necessary or advisable, beyond seeing that the general health is being attended to and that no foci of infection, such as oral sepsis, are being harboured; but if there are any signs of failing reserve the condition must be attacked at once, and here there is one group of drugs which is all-powerful—viz., the digitalis group.

Mackenzie long ago pointed out that the group of cases presenting the perpetually irregular pulse is that in which digitalis made its great reputation, and the effect of this drug on a suitable case is very striking. Its good results may be most confidently looked for in cases of old rheumatic carditis, and it should be pushed till the desired results are obtained, or till signs of full-dosage—viz., headache, vomiting, &c.—are produced. If less than full doses are given, good results may not be obtained even in highly suitable cases, for there is an extraordinary diversity in the susceptibility, even of apparently similar cases, to this drug. No danger need be apprehended from full doses, provided the patient is kept under careful observation and the results of the drug watched; and even without this—*e.g.*, in out-patient practice—large doses may be safely administered if the patient is warned of the symptoms of overdose and is seen at comparatively frequent intervals. The first sign of overdose we are usually told to watch for is a diminution in the amount of urine passed, but this seems only to appear when the patient is beginning to be nauseated, and thus taking less fluid; and there is no fear of overdose if he is comfortable, without nausea, headache, giddiness, or diarrhoea, and the pulse is not unduly slowed.

It is essential that the heart-rate should always be counted with a stethoscope at the chest in these cases, or by efficient graphic methods, as a common result, when the drug is continued after its action has slowed the heart, is a coupling of the beats, each full beat being followed by an extrasystole, usually ventricular in origin, the small beat caused by which is frequently impalpable in the radial pulse at the wrist. This is a danger-signal, and the drug should at once be stopped until the coupling has disappeared, when it may be recommenced in smaller doses. In some few cases the heart remains slow and the patient comfortable after the digitalis has been stopped, and the patient can get about in comfort without treatment, but usually it is necessary, after allowing all the unpleasant symptoms of full-dosage to pass off, to recommence the drug in suitable dosage, the patient discovering by experiment, under his physician's guidance, how much is necessary to keep him in comfort without symptoms. In a few cases there is no response to digitalis, the rate remaining rapid or increasing, and here the prognosis is absolutely bad, no other drug having any action, and the patient drifts to his death in a few months.

It must be remembered that digitalis is liable sometimes to cause fibrillation in cases which did not previously show it, so that it is unwise to use this drug in cases where the periods of fibrillation are short, as it may tend to perpetuate the condition. In the ordinary case this consideration need cause no difficulty, as in the vast majority fibrillation once established continues till death, and it is well to reassure the patient that this is quite compatible with life and activity, and care and digitalis may give him a long term of comfortable life.

Among the very few single signs to which real prognostic importance must be attached, pulse alternation takes a prominent place. All further work has strengthened the position laid down by Mackenzie—that the appearance of the pulsus alternans when the heart is beating at a comparatively normal rate is of very grave significance, and that it denotes a very serious degree of exhaustion of the cardiac muscle. Windle (36), in a considerable series of cases, has shown that few if any are alive three years after the recognition of this sign, and in most cases the fatal ending comes within a much shorter period. The condition is commonly found during attacks of paroxysmal tachycardia and of auricular flutter, where the ventricles are beating very rapidly; but here the prognosis is greatly modified, for there is every prospect of the abnormal mechanism giving place before very long to a normal beat, allowing the ventricle to obtain its proper periods of rest, and so to recover from its exhaustion, which is largely due to the excessive work demanded by the rapidity of the new rhythm. In auricular flutter, even if the auricular tachycardia continues, increased difficulty of conduction along the bundle to the ventricle may increase the block and slow the ventricular rate, thus allowing its muscle more rest. In any case also where there is a definite cause for the tachycardia and cardiac weakness, whose disappearance may be anticipated—*e.g.*, toxaemia from some known septic focus, or in the course of an infectious disease—the prognosis is improved, and such cause must be carefully sought for; but where the alternation persists at normal rate or at an increased rate which cannot be slowed, and in spite of a careful, well-ordered, and restful life, the prospects of improvement are small and the end is in sight.

It is of importance to remember that only very gross alternation can be recognized by palpation of the radial pulse, and even here there is great possibility of error, so that a radial curve, obtained either by a Dudgeon sphygmograph or, if extrasystoles are occurring only at long intervals, better with an ink polygraph, is essential, and the curve must be a good one. Such a curve should be taken in every case of cardiac pain or distress, and every case presenting undue limitation of the field of response to exertion, particularly if the patient be at or beyond middle age, and carefully examined for alternation, as this condition is most common in cases of cardiac degeneration from arterial changes, prolonged toxaemia, and old age.

Morbid Anatomy.

The pathological researches of Aschoff (1), Carey Coombs (2, 3), Poynton and Paine (25, 26), and many others, coupled with the recognition by graphic methods of arrhythmias suggesting focal involvement of cardiac muscle, have considerably illuminated the field of acute cardiac disease, and have shown us how essential it is to look on the cardiac involvement of rheumatism, diphtheria, &c., as an actual and direct infection of the organ. Lees (12, 13) has for long been calling attention to the universal involvement of the heart-muscle in rheumatism as revealed by dilatation; and Aschoff and Coombs have shown further that there is in each rheumatic attack an actual focal infection of the muscle. The infecting organism is distinguished by a comparatively low virulence, and the nodules described by these observers are made up of large multinucleate cells apparently fibro-blastic in origin, and probably represent a reaction of the connective tissues at the actual points of infection. They are readily distinguishable histologically from the lesions caused by other virulent cocci when they affect the heart. Coombs has shown that experimentally this also applies, and the heart-lesions caused by inoculation of the rheumato-coccus are easily distinguished from those produced by pyogenic organisms. The lesions which are produced experimentally are more acute than those found as a rule in the human heart, and there is more leucocytic reaction, but the changes are practically identical with those got in cases where the rheumatic infection is intensely acute: *vide* Sutherland and Coombs (33).

The submiliary nodules are commonly most plentiful in the ventricular walls. The left ventricle is much more affected than the right, and the nodules are chiefly found near the root of the aorta and the mitral ring, and at the apex near the interventricular septum. The auricles usually show few nodules, but in Sutherland and Coombs's case they contained many nodules; and here the auricles passed into fibrillation before death, which occurred on the sixth day of the illness. Some nodules have been found in the hearts of all children dying of rheumatism, in which they have been thoroughly searched for, and scars representing cicatrized nodules are met with in many cases of old healed rheumatic carditis, where there is no suspicion of any other cause for scarring, such as syphilis. It seems almost certain that in the vast majority, if not in all, cases of heart-failure in children with rheumatic hearts the breakdown of the ventricle is due to an acute myocardial involvement. Only rarely, if ever, does the child's heart exhibit the picture, so common in adults, of an imperfectly nourished or damaged ventricle, failing because the muscle has been taxed beyond its strength, and the abnormal and unfavourable rhythms which may help to cripple a heart are rare in childhood. At times a definite proof of focal involvement is got by the recognition of partial heart-block or a delayed conduction-time giving a prolonged a–c interval, or by the appearance of premature systoles; but this is not very common in proportion to the number of cases of rheumatic carditis, and the absence of these signs merely shows that no nodules are present in any of those parts of the cardiac tissue which will, when affected, give rise to alterations of rhythm.

Again, more careful study has shown that in any severe rheumatic infection the pericardium is very frequently affected, far more often than is usually recognized; and, of course, the spread of infection to the valves, in the depths of which typical nodules may be found, is common.

These considerations show the importance of regarding every rheumatic attack as a general acute infection of the whole heart—a pancarditis—and of making every effort to ascertain the degree of involvement, besides recognizing the supreme importance of lessening the work of the cardiac muscle till the inflammation has subsided. Our means of estimating the degree of carditis are still extremely crude, and until more certainty is possible it is necessary to err on the side of caution, and not to regard a heart as unaffected or cured unless it be capable of sustaining a normal amount of exertion without disturbance.

The treatment of rheumatism of the heart remains very unsatisfactory, but there can be no doubt of the action of the salicylates on the fever and joint conditions, and there is no reason to doubt that this depends on a specific effect on the organisms, either germicidal or inhibitory. It is sometimes argued that salicylates can have no specific action, since the incidence of heart-inflammation seems only slightly if at all diminished by their use; but this is not convincing, since even a short infection may result in great and irreparable damage, and even an actively specific drug might fail to take effect in time to prevent permanent injury. At the same time, this affords no reason why we should not attempt to cut short the infection.

It is now certain that salicylates may be given in large doses without danger of cardiac depression, provided large doses of alkalies are administered at the same time, so that, as even a slight action is important and no other drug is of any value, their thorough and sustained use in rheumatism is most desirable. The point of real importance is the recognition of the fact that the heart of rheumatic fever is in a condition of acute pancarditis, and that the grave effects to be feared in a case of pericarditis, for example, are not due to the topical infection of the pericardium, but to the extreme and widespread infection of the tissues of the whole organ which the pericarditis indicates. The damage is severe, rapid, and, so far as the actual nodules are concerned, probably to a great extent irreparable; but much of the general toxic spoiling of the muscle and of the inflammatory changes surrounding the nodules may be completely recovered from if the condition is appreciated and thorough treatment given over a prolonged period.

The treatment being so unsatisfactory, naturally the question of prevention takes on an added importance, and is now exciting much interest. It seems probable that the infection primarily enters through the tonsils and naso-pharyngeal lymphoid tissue, and then is carried through the body in the blood-stream; but the attempts to prevent reinfection by removal of tonsils and adenoids have been attended by very doubtful success. It is probable that the organism, having obtained an entrance, lurks in the body at times in a quiescent state, and then another attack is lighted up by some unknown cause; but the tonsils are known to be infected sometimes with the rheumato-coccus of Poynton and Paine, and they seem to be a fruitful source of various infections, so that it is certainly advisable that in rheumatic children, or in those thought to have rheumatic tendencies, the tonsils should be ablated.

In many other infectious diseases—*e.g.*, influenza, diphtheria, typhoid—there is a widespread poisoning of heart-muscle, and the same precaution is necessary to protect the still weakened heart from overexertion as has been advised in the recovery from acute rheumatism. Focal lesions are found in some cases, extrasystoles being commonly present after influenza and diphtheria, even in cases which had presented none before the attack, while paroxysmal tachycardia and even auricular fibrillation are sometimes found (10, 27). Several cases of heart-block have been recorded after diphtheria, and others after influenza (7, 9, 27, 22).

Syphilis is not an uncommon cause of heart-block, either by a gumma involving the bundle or by a more diffuse infiltration of the tissue. Heart-block appearing in a comparatively young person who has not suffered from a recent acute infection should always be regarded as probably syphilitic, unless this disease can be definitely excluded. Under appropriate treatment a complete cure can be got in such cases if they be recognized before the bundle-tissue is actually destroyed. The frequency of direct syphilitic infection of the heart is probably much greater than has been recognized hitherto, and Warthin (35) has shown that even in congenital syphilitics, spirochaetes in large numbers may be demonstrated in the heart-muscle. He describes a special kind of interstitial myocarditis, which may be localized or diffuse, but which is different from true gummatous formation, and results from congenital syphilitic infection. Syphilis of the heart is also probably much commoner in acquired cases than is usually recognized. The role of syphilis in causing arterial degenerations and leading to aneurism has been recognized for many years, but latterly attention has been called to the fact that the aortic lesion is an acute inflammation, frequently a mesoartitis of an actively syphilitic nature, and that spirochaetes in large numbers can be found in the lesion (23). Syphilis is not the only infection capable of causing mesoartitis and leading to aneurism, but it is by far the commonest, and in all cases which present symptoms the least suggestive of aortitis this disease should be very carefully searched for, and, if present, thorough and prolonged treatment is essential (17). Unfortunately, both symptoms and signs are slight in early curable cases, but if a patient has any suggestive symptoms or signs, and the Wassermann reaction is positive, vigorous treatment is called for.

The Action of Drugs in Heart-failure.

Of recent years much work has been done, both experimentally and clinically, in the effort to determine by precise methods the action of drugs upon the heart. It is perhaps not too much to say that the only drugs in general use which have a definite and demonstrable effect on the heart are those of the digitalis group. The supposed effects of strychnine (4), camphor, and the like cannot be actually demonstrated, and remain still a pious belief of the clinician, though efforts are constantly being made to show some definite action. Mackenzie has pointed out that it is rare for a tincture of digitalis, procured in the ordinary way from a reputable druggist, to be inert, but that the reaction of the heart to the drug varies with the nature of the lesion ; and his own and other observers' work has established this latter fact thoroughly, and has provided us with some definite knowledge to aid us in using the drug. It is here, perhaps, that the polygraph finds its best use. It may be very difficult or even impossible to unravel a complicated venous curve, and it is likely that the more precise and definite electro-cardiograph will replace the older instrument as a diagnostic apparatus, but the diagnosis once made, the convenient and portable polygraph will usually prove amply sufficient as a guide to the results of digitalis in treatment. The best results from digitalis treatment are, of course, got in cases of auricular fibrillation, especially where the lesion is an old rheumatic one, but at times in cases of this form of arrhythmia remarkably good results may be obtained, even in the hearts of old people, and in those where the lesion is due to a toxin—*e.g.*, exophthalmic goitre.

In spite of much careful work by many observers the probable results of digitalis-administration in cases where the rhythm is normal are very difficult to forecast, but there is undoubtedly a definite action direct on heart-muscle as well as a powerful vagal stimulation, as is shown by the inability of atropine to remove all the results of digitalis. Until our knowledge is much more precise the wisest course to pursue is to use digitalis in all cases of heart-failure with dilatation and dropsy, no matter what is the state of the heart, provided rest and good general treatment fail to allow of the recovery of the organ. In any case where it is considered that digitalis is definitely indicated, and should react favourably, it is essential that the drug be pushed till symptoms of poisoning—*e.g.*, headache, nausea, giddiness, &c.—are produced before it is discarded as useless. It is not uncommon to see cases of auricular fibrillation which have failed to react to a dose of tinct. digitalis mx., t.d.s., continued for some weeks, react promptly and satisfactorily to twice the dose. Of course, if a perfect result is obtained earlier, there is no need to push the drug till unpleasant symptoms are produced, but often the symptoms are noted before any cardiac effect has become obvious. The drug is then stopped for a while, and the pulse is frequently found to be slowing satisfactorily and the symptoms of heart-failure disappearing, the improvement having apparently set in almost immediately after the onset of the symptoms of full-drug dosage. As soon as the symptoms of full-dosage appear, the drug should be withheld for a day or two, and then given again in smaller doses, just sufficient being used to retain the good effects.

It is doubtful whether any absolute contra-indication to digitalis exists, since in some cases, where it produces undesirable symptoms or signs, its omission is accompanied by progressive heart-failure, but certain signs are danger-signals, and indicate that the drug must be stopped if possible, or at least used with very special care. The chief of these are—

(*a.*) Partial heart-block or increased a–c interval, due to an incomplete lesion of the a–v bundle. In these cases digitalis, partly by a direct muscular action, and very largely by its action on the vagus, increases the difficulty of conduction, and may increase the block or cause a previously lengthened conduction period to increase till some impulses are blocked. Frequently where there is heart-failure the patient may feel much relieved while under digitalis, in spite of the increased difficulty of conduction, and the drug may need to be continued, though at times a combination with atropine is successful in abolishing the vagal effect.

(*b.*) Pulsus alternans: In cases where this condition is present digitalis should be used very cautiously, and only where the patient is under careful observation. It often happens that the patient feels distinctly improved for a day or two, and then complains of a feeling of exhaustion, which increases while the drug is continued. This is a symptom of great gravity, and if not attended to fatal results may ensue.

(*c.*) Extrasystoles have been said to be banished by digitalis, but the much more common experience is that their numbers are increased by the drug, and its administration may certainly be followed by their appearance in cases where they were previously absent. In cases of auricular fibrillation the well-known coupled rhythm produced by digitalis is due to the incidence of a ventricular extrasystole following each response to supra-ventricular stimuli, and in these cases the appearance of the premature beats must be regarded as a danger-signal, as several sudden and unexpected deaths have occurred in such cases, probably from ventricular fibrillation. At times the symptoms of heart-failure become marked again immediately the drug is stopped, but here the physician must use his own judgment in each individual case, and decide which of two evils is the greater ; but it is extremely important that he should at once recognize the coupled beat and appreciate its significance and dangers.

High blood-pressure was at one time considered to be a contra-indication to digitalis, but much evidence has accumulated in opposition to this view, and there is no doubt that cases with very high blood-pressure are frequently greatly benefited by the drug. In many cases at least the blood-pressure rises as the heart fails, and if the heart-beat is slowed and strengthened, the circulatory balance is readjusted and the blood-pressure falls again. The administration of digitalis will only very rarely be found to cause an appreciable rise of blood-pressure in clinical cases.

Myocardial degeneration is certainly no contra-indication to the use of digitalis, which often is of great value in cases where the heart-muscle is much degenerated. The value or otherwise of digitalis to a heart labouring in the grip of a toxin is still uncertain, and much work requires to be done to settle this point. However, we know that it may be of great value at times in exophthalmic goitre and pneumonia, and at times also in acute rheumatism, and there is no doubt that it should be thoroughly tried where the heart is progressively failing in spite of treatment in any acute disease.

The other drugs of the digitalis group act similarly but less strongly and certainly than digitalis, and no advantages seem to be got by their substitution for it.

Though strophanthus and squills seem less liable to irritate the stomach, they are apparently more irritant to the intestine. Strophanthus is less readily absorbed from the intestine than digitalis, and this irregularity and difficulty of absorption make it more perplexing to handle effectively, and usually much larger doses are required ; while squills is irregular in absorption, weak in action when administered by the mouth in man, and is very rarely required where digitalis can be used. If a very rapid action is required in cases of emergency, strophanthin in doses of $\frac{1}{250}$ gr. to $\frac{1}{200}$ gr., given in about a drachm of saline solution into a vein, will act strongly in about five to fifteen minutes. The dose may be repeated once or twice at about three-hourly intervals. Not infrequently in cases where dropsy is considerable it fails to clear up even when digitalis is pushed, and here astonishing results are often got by the exhibition of theocin sodium acetate, given in one dose of 10–15 gr. or in three doses of 4 gr. each within a period of twelve hours. The patient should be well under the influence of digitalis before the theocin is given, and then a full dose is administered within twelve hours, and no more until its effect is exhausted, as it is distinctly a renal irritant and no good effect is obtained by continued administration.

My remarks on diagnosis and treatment have dealt almost entirely with advances due to graphic methods concerned in the main with the time-relations of the heart-beats and of events in the cardiac cycle, and to a lesser extent with the origin and direction of passage through the heart-muscle of impulses giving rise to the contractions.

There is a tremendous field to be covered as regards the work of the heart. At present we have to depend entirely on common-sense methods to estimate its capacity for work. No short cuts here have so far proved of the slightest value, and the only way is to carefully inquire into the subjective symptoms caused by the ordinary activities of life, and to test the results of reasonable exertion and the heart's capacity to satisfactorily react to a call for work.

The prime factor in the maintenance of the circulation is an efficient output from the left ventricle. Arterial resistance affords no motive power; it is merely regulatory. Ventricular output can be measured experimentally in animals, and there are grounds for expecting that it will soon be satisfactorily estimated in man.

It depends upon two factors—(1) The efficient driving-power of the heart-muscle; (2) proper diastolic filling of the heart. The latter is chiefly conditioned by the pressure in the venous side of the circulation, our knowledge of the mechanism of which is far from complete. Even such knowledge as we have already derived from experimental work we are unable to apply clinically, since in man we cannot measure pressures or accurately note changes on this side; and it is of such enormous importance to the carrying-on of a satisfactory circulation that our work will never be brought to a proper condition of accuracy till this great problem is solved.

I have of necessity limited my remarks to the irregularities, because they can be recorded and measured, and advances can only be made by such accurate measurement. The day of "impressions" is over.

It is only along such lines laid down by Mackenzie and Wenchebach, and carried on by Lewis and others, that our knowledge will progress.

REFERENCES.

1. Aschoff. Brit. Med. Journ., 1906, ii, 1103.
2. Carey Coombs. Journ. Pathol. & Bact., 1911, xv, 489.
3. Carey Coombs. Quart. Journ. Med., 1908–9, ii, 26.
4. Carey Coombs, Miller and Kettle. *Lancet*, 1912, ii, 1209.
5. Cohn. Journ. Exper. Med., 1912, xvi, 732.
6. Cohn and Fraser. *Heart*, 1913–14, v, 93.
7. Cowan, Fleming, and Kennedy. *Lancet*, 1912, i, 277.
8. Cushny and Edmunds. "Studies in Pathology, &c.," Aberdeen, 1906.
9. Fleming and Kennedy. *Heart*, 1910–11, ii, 77.
10. Hume. *Heart*, 1913–14, v, 25.
11. Kosteweg, quoted by Ritchie. Quart. Journ. Med., 1913, vii, 1.
12. Lees and Poynton. Med. Chir. Trans., lxxxi.
13. Lees. Proc. Roy. Soc. Med., 1909, ii, 34 (Therapeutic Section).
14. Th. Lewis. Brit. Med. Journ., 1909, ii, 1528.
15. Th. Lewis. *Heart*, 1909–10, i, 306.
16. Th. Lewis. *Heart*, 1911–12, iii, 161.
17. Longcope. Archiv. Int. Med., 1913, xi, 14.
18. Jas. Mackenzie. "Study of the Pulse," 1902.
19. Jas. Mackenzie. Brit. Med. Journ., 1904, i, 529.
20. Jas. Mackenzie. Amer. Journ. Med. Sci., 1907, cxxxiv, 12.

21. Jas. Mackenzie. Quart. Journ. Med., 1907–8, i, 39.
22. Jas. Mackenzie. "Diseases of the Heart," 1908.
23. Osler. Brit. Med. Journ., 1909, ii, 1509.
24. Parkinson and Rowlands. Quart. Journ. Med., 1913, vii, 42.
25. Poynton and Paine. *Lancet*, 1900, ii, 861, 932.
26. Poynton and Paine. Med. Chir. Trans., lxxxv, 211.
27. Price and Ivy Mackenzie. *Heart*, 1911–12, iii, 233.
28. Ritchie. Quart. Journ. Med., 1912–13, vi, 47.
29. Ritchie. Quart. Journ. Med., 1912–13, vii, 1.
30. Canby Robinson and Draper. Journ. Exper. Med., 1912, xv, 14.
31. Canby Robinson. Journ. Exper. Med., 1913, xvii, 429.
32. Rothberger and Winterberg. Wein. Klin. Woch., 1909, xxii, 839.
33. Sutherland and Coombs. *Heart*, 1913–14, v, 15.
34. Thayer. Trans. Assoc. Amer. Physic., xxv, 75.
35. Warthin. Amer. Journ. Med. Sci., 1911, cxli, 398.
36. Windle. Quart. Journ. Med., 1913, vi, 453.
37. Lewis. *Heart*, 1910–11, ii, 127.

DISCUSSION.

Dr. STUART MOORE (Dunedin) said that the modern work done in connection with heart-disease originated and has been led by a man who was originally a general practitioner, and who has in a remarkable manner kept his head and realized the limitations of the work that has been done. The work has been skillfully summarized by Dr. Turnbull. It has established itself, and I shall not waste time in making an appreciation of it at any length. It is true that the more expert a man is at taking and interpreting curves the less necessary is it for him to take them. An idea is apt to gain ground that for this reason a sound knowledge of this modern work is unnecessary in practice. I wish to say most emphatically that in a large number of cases a man who has such a sound knowledge will in treatment score heavily off a man who does not possess that knowledge.

The diagnosis and treatment of most cases of disease should be considered from three points of view—(*a*) Local or symptomatic, (*b*) constitutional, (*c*) psychological.

The men who lead this modern heart movement are alive to the importance of constitutional treatment, but the most important thing to be done up till now has been to establish the new facts and make their importance realized. The time has come, I think, for a more thorough appreciation and study of the effects of constitutional treatment in the light of our new knowledge. It is only by searching for constitutional conditions and continuing to treat them after we have by symptomatic treatment with digitalis, rest, &c., brought the patient to more or less obvious health that we can prevent relapses and do our best for our patients. Dr. Turnbull has emphasized this, but I feel in the publications I read the want of after-histories which tell us how the original constitutional condition has been by chronic treatment for a chronic condition tracked to its lair and done for.

I have, for instance, come to a standstill in progress in a case of auricular fibrillation with digitalis, but succeeded in setting the old woman of sixty on her feet by using thyroid extract in addition. This confirmed my original diagnosis of auricular fibrillation plus some degree of thyroid inadequacy. In another case of auricular fibrillation with a rheumatic history the normal auricular rhythm reappeared after symptomatic treatment with digitalis, &c. There was, however, present evidence of disturbed contractility, and occasionally a ventricular beat of the heart was missed. Under antisyphilitic treatment this man resumed work as a bricklayer and was habitually working full time; one year after discharge from hospital he was free from symptoms. I believe I got this result by continuing chronic treatment for the constitutional condition when he was apparently well. He denied syphilis, but Dr. Champtaloup had reported a positive Wassermann. This man had been told that he would never work again.

In every heart case we should search for a constitutional condition, in the same way as we should do in chronic arthritis. Gout and its treatment is far too seldom noticed nowadays in reports of heart cases. Mackenzie does not mention colchicum in treatment. Balfour believed in it, and his opinion cannot be ignored. Arsenic, too, must be remembered, though I cannot claim to have seen much good from its use. Sepsis not only in the gall-bladder and ethmoidal cells, but anywhere, must be sought for. Pickerill reports cases where reflex irritation, from teeth, which should have caused pain but did not, showed itself in cardiac disturbance. This disappeared when the teeth were treated. I have had some cases of heart-trouble following influenza where the use of the Nauheim baths and Schott exercises were followed by brilliant results after prolonged treatment by other means had failed.

In cases of heart-disease with regular rhythm and dyspnoea without cyanosis, rhubarb and soda is often the best medicine I know. Lewis in a recent paper has said that such dyspnoea is often due to non-volatile acids, and suggests the possibility of alkalies doing good.

Before speaking of the psychological aspect of disturbances of the heart I should like to say a few words about the use of nitrites. The use of nitrites over a period of two or three weeks or so at a time is clinically found to benefit patients. The usual method is to administer nitrites and see if they do harm. If they do not upset the patient their use is continued for a little to see if good will result. Clinically observations on the blood-pressure have failed to substantiate any prolonged lowering of blood-pressure as a result of their use. Some observations I have made merely by the use of the finger on the diameter of blood-vessels cause me to raise the suggestion that perhaps the beneficial action of the more or less continuous use of nitrites for, say, three weeks is due to increase in diameter of the arteries, which continues in spite of the fact that soon after nitrites are administered the blood-pressure rises again to its original level. What leads me to make this suggestion is a clinical impression which I received through the tips of my fingers from the radial artery in three cases of auricular fibrillation. In two of these cases the diameter of the radial artery was small and remained so after the administration of digitalis. The exhibition of liquor trinitrini in one case in doses of mxx, t.d.s., and in smaller doses in the other case, I believe, did good.

Another clinical impression: The vessel always seemed to my finger to be of larger diameter when the patients were taking nitrites, and I had then much less difficulty in obtaining a radiogram. I have another case of fibrillation of the auricle in a woman of sixty years, which was woefully neglected for three months, being treated without any or with absolutely inadequate dosage of digitalis. During this period the ventricular frequency had an upward movement, while the count at the wrist had a downward one. Fewer and fewer beats of the ventricle were opening the aortic valves or appreciably affecting the arterial pulse. The only way in which the arterial tension necessary to life could be maintained in the presence of such prolonged and marked ventricular inefficiency was by contraction of the arterial system. This was much more marked at the end of the three months than at the beginning of that period. When this case came under my care for the second time I at once used digitalis as directed by Mackenzie in large doses, and a brilliant result was obtained. The general nutrition was markedly improved, and a psoriasis, for which all other treatment was stopped except the digitalis, at once got well. But the point to which I wish to draw attention is that the clinical impression of my finger from the radial pulse—is that the diameter of the vessels increased in size. This was confirmed to some extent by the ease with which a radiogram could be obtained. Of course, it is dangerous to draw conclusions from that, but I am not doing so; I am merely suggesting a line of investigation. In this case, as was to be expected, quite small doses of liquor trinitrini gave rise at once to symptoms of poisoning.

My suggestion from inexact observation by impressions is that in studying the action of nitrites we should pay attention to the diameter of the arteries, and that in fibrillation of the auricle when the artery remains contracted under digitalis there may be an indication for the use of nitrites. On the other hand, when in fibrillation of the auricle digitalis is used and the diameter of the artery is increased, nitrites are contra-indicated. If extended and more exact observation confirms my impressions we should in this class of case, and perhaps in others, have a guide to the use of the nitrites which would enable us to avoid the discomfort of what we could foresee would be a useless experiment with nitrites. Lest I be misunderstood, I must say that it is quite unsafe to start the administration of nitrites in any case in doses of mxx. The dose suitable to any case must be determined by experiment, and I have given a dose of ʒi with benefit to the patient.

Now, as to the psychological study of diseases of the heart: The heart is notoriously under the influence of the emotions, and sexual emotion produces profound circulatory changes. Anxiety neurosis is a clinical condition whose existence has been established by Freud, in which profound syncope, angina pectoris, attacks of breathlessness, &c., may occur. This condition is due to somatic sexual injuries. The electro-cardiogram would tell us exactly what happened in the heart, but would not reveal the disturbances on which these changes depended. I have but begun to investigate cardiac cases from a psychological standpoint at all fully, but as showing the problems which I at once meet I may mention some cases.

A case where X-rays showed an aneurism had anginous pain. That man had baldly expressed homosexual and onanistic dreams. In spite of the presence of the aneurism, which was small, the possibility of the pain being of neurotic origin or intensified by neurotic action has to be investigated, and by Freud's method this problem is capable of solution.

Again, I have a case of mitral stenosis and regurgitation with anginous pains. The patient has obviously an anxiety neurosis, and had that condition (not so badly developed as it is now) long before she suffered from symptoms of heart-failure. I have another patient with persistent tachycardia. She also has anxiety neurosis. I have yet to discover if this condition is fully accounted for by the neurosis. In a young man where the history suggested that his functional cardiac disturbance, which had lasted some months, was due to an anxiety neurosis connected with unconscious homosexual desire, I at once obtained an infantile and adult confession favouring my view, and he was relieved of starting awake from his sleep each night. This happened three weeks ago.

The future research on heart-disease will not be made along the lines laid down by Lewis alone. The psychological study of our patients will be necessary. Until we study our heart patients from that point of view we will, I believe, never unriddle any problems connected with functional disturbance of the heart, nor clear away some of the confusing relations between symptoms and lesions which still remain in organic heart-disease. Further than this, I believe that the development of our emotions will yet be traced along two lines to simple reflex action and to biochemistry. I believe that the methods of the examination of the heart which we have been discussing to-day will play an important part in corelating psychology and physiology. It seems to me that Mackenzie's appreciation of the nervous factor in heart-disease as given in his book is incomplete even apart from psychological methods. Balfour, in his book "The Senile Heart," gives in some respects a more just appreciation of this factor. I suppose that in his book Mackenzie could not occupy space enlarging on what has been so ably demonstrated by Balfour.

The use of instrumental methods, far from lessening the education of the finger, improves the utility of that organ by checking its observations.

Time forbids me mentioning cases in which I would have been in a dense fog but for Mackenzie's work.

Dr. SPRINGTHORPE (Melbourne) whilst admitting the educational and graphic value of the work of the Mackenzie school, placed it second clinically to the results obtainable and obtained by the trained finger, ear, and eye, not only as regards diagnosis and treatment, but also from the student's point of view. It was a fact, also, that many clinicians, himself included, had arrived at most of the conclusions and placed the cardiac muscle in much the same position long before Mackenzie had adopted his new nomenclature and point of view. He would be the last to belittle the laboratory and the instrument of precision, but the present tendency was to magnify their importance at the expense of the common and fundamental. Personally he found more value for cardiodiagnosis and prognosis in listening, percussing, and clinically viewing his cases along the lines laid down in the table which he was bringing before the Congress in another paper.

Professor COLQUHOUN (Dunedin) said he believed that the methods of examining cardiac cases described by Dr. Turnbull must in future be taught in all the medical schools, and that they would ultimately be largely made use of in the practice of medicine. The electrical methods of examination as practised by Dr. Lewis and others are still too expensive and complicated for ordinary use, and it will probably be some time before the interpretations of the polygraph and electro-cardiograph are anything like complete. In the meantime the value of the work done by Dr. James Mackenzie and his pupils in the diagnosis of cardiac disease, and along with Professor Cushny in therapeutics, has been everywhere recognized. It is creditable to English medicine that the chief London hospitals have been quick to see the importance of these newer conceptions of diseased conditions (for much of which we are indebted to the physiologists of Britain, America, and the Continent), and that Dr. Mackenzie's services have been sought by some of the larger London hospitals in founding new departments for cardiac study.

Dr. TURNBULL (Melbourne), in reply, said he wished to differ entirely from Dr. Mill's suggestion that the main treatment of rheumatism was six weeks' rest in bed. In some cases it was obviously unnecessary to keep the patient in bed so long, while in cases where the heart was seriously affected this period of rest was quite insufficient. He contended that the amount of rest necessary depended entirely on the amount of cardiac affection and the manner in which the heart responded to exertion when tested after the acute condition appeared to have settled down. Often six or even twelve months' rest was necessary, and excellent results might be got after such a period of treatment. He had not laid stress on the use of alkali with the salicylate, as he thought that, owing to Lee's teaching, this had now become a commonplace of medicine. In answer to Dr. Jamieson, he stated that it was not contended that Mackenzie had originated the idea of the importance of the heart-muscle. Mackenzie himself acknowledged his indebtedness to many clinicians, but it could fairly be claimed that he had taught much more clearly than others how this power was to be estimated, and had raised the study of the muscle-power from an academic conception to a clinical problem of the utmost importance. He had also shown how essential was the study of cardiac-muscle function, and that a sound knowledge of this in any particular case gave a clue to prognosis and treatment which could be got in no other way.

THE TACTUS ERUDITUS.

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IN these progressive days, when specialism calls for ever minuter and more accurate observation, and when science has invented many subtle instruments of precision to mathematically and otherwise mark and record all kinds of movements, it is not out of place to remember that, after all, it is upon our senses that we depend for all external information and that they are the only known avenues through which external phenomena reach our consciousness.

As regards two senses—those of hearing and sight—though the student, to his permanent loss, is very far from being scientifically trained during his pupilage, it may perhaps be admitted that the practitioner regularly makes great and at times sufficient use of his opportunities.

As regards two others—those of taste and smell—we cannot nowadays be said to train them at all clinically, or to use them other than exceptionally and perfunctorily, though we have ample evidence from the lower animals—and Sherlock Holmes—how they are always useful and at times invaluable; and have learnt from Helen Keller how it is possible to recognize places, conditions, and persons by smell, even in the total absence of information through any other sense.

It is the purpose of this paper, however, to raise a plea for the far more thorough training and far wider use of the remaining sense—that of touch. This is the fundamental, the first developed, the most extended, and the most extensively used of all. Like the common and basal everywhere, it has been pushed out of its pre-eminence by the special and the exceptional. The wonders of the recognized Queen and Princess, sight and hearing, are so acclaimed that the Cinderella, touch, remains an unnoticed handmaiden in the background. But when the common-looking lamp is rubbed, the response may be, and often is, miraculous. Thus a Leonardi de Vinci finds that he can discover with his fingers beauties in statuary too fine for interpretation through the eye ; and a Helen Keller learns, almost entirely through her fingers, more than most of her American sisters have gathered through all their senses, cultivated during an extended university training. Similarly, we have the blind telling brass from gold, and expert masseurs performing wonders in certain diseases of joints, muscles, nerves, &c., by the same single means.

As a general rule, the sense of touch has thus been left simply "to grow," like Topsy. Two recent advances, however—the Montessori system of education and Pottinger's clinical investigations and advocacy—have brought its informative value into special prominence.

In the Montessori system of educating the feeble-minded, remarkable, almost incredible, results have been obtained, and defectives made to take rank alongside, and even in advance of, normal children trained in the usual manner. In this system the first step is the training of the senses. Touch is specially considered because the sense of touch "is the first developed and the first dulled if uncultivated." By suitable apparatus the child is taught to distinguish, blindfold, between rough and smooth, subtle gradations of texture, weight, form, dimension, &c., and perform a number of acts that are usually done by reliance upon other senses. The senses of sight and hearing are, of course, similarly trained systematically. The time will, no doubt, come when some such training of the senses (touch included) will be the introduction to all education. Then the medical student will enter upon his hospital studies thoroughly well qualified to avail himself of his tactile opportunities. Even in the meantime, what an increased interest and fund of information would be within his grasp if, from the outset of his hospital practice, he conducted his clinical work on the same sound lines !

This, I take it, should be the sustained aim of his clinical teacher. For years I have urged students to, above all else, look for and at, and to listen to, everything that they could clinical, normal as well as pathological. As a basis for this in auscultation, I have always started them on Austin Flint's table, which I heard brought forward at the London Medical Congress in 1881. My dealing with heart-conditions also led me finally to the Table of Auditory Representation, which I am presenting before this Congress in another paper. Similarly with the sense of smell, that is fast vanishing as a protective and informative influence, I always recommend its clinical cultivation by smelling gas, effluvia, pus, excreta, urine, sputa, vomit, &c., as well as odours of every kind. Were all this to be recognized by the student as superior—at this stage—to reading and far more important than memorizing from other people's observation and "clinics," we would, in my opinion, have a band of young practitioners more reliable and skilful upon a certificate of "having sufficiently availed themselves of their clinical facilities" than at present enter upon practice through the portals of examination.

In the same manner I have always recognized the fundamental importance of the tactile sense, both in its afferent and efferent influence.

Gradually during my post-graduate work in London (1881–83) I became more and more impressed with, and practised, the light percussion and reliance upon the sense of resistance which I learnt from the late Sir Douglas Powell. I next admired, though for long I did not understand, the wonderful results of certain experts—notably the late Sir Thomas Fitzgerald—whose fingers gave them more and better information than most practitioners' combination of half-trained senses. This led me to the systematic training of my own fingers, at first along the recognized lines so well described in Da Costa's "Physical Diagnosis." Progressively I was pleased to find that I became able myself to recognize what I had previously only envied in others. I was coming to my own. Thus, without any knowledge of Montessori or Pottinger, I began experimenting with texture of clothing, bedding, &c., size and consistency of coins, keys, fragments of various objects, more or less enveloped, near or distant, proceeding through known objects and conditions to the diagnosis of unknown objects and conditions. All this I then applied to human anatomical conditions, beginning with the normal, and following up on the pathological, testing and, so far as possible, verifying by all other reliable clinical means; attempting to ascertain and correlate through touch what I knew through the other senses, and gradually extending all this from common to uncommon conditions. Surface conditions from all tactile points of view, infiltrations due to fat, fluid, gas, &c., inflammations in time became diagnosable comparatively easily, and with a greater certainty in many cases than I had attained through the eye. The state of some veins and lymphatics (with associate glands), and the size, state of walls, external pressure, and other conditions of vessels, especially the radial, furnished another exceedingly interesting and profitable study. It is a strange comment upon our neglect in this respect that the physicians of comparatively recent times used to recognize some hundred different kinds of pulse, as compared with the dozen or so with which our text-books still keep us in touch. It was this that first led me to dispute the manometric claim of the necessary danger of a high blood-pressure (*vide* my paper in the Intercolonial Medical Congress, 1908), and led me to divide arteriosclerosis into stages of velvety extramuscular, distended, fibroid, and calcareous. A similar testing of tactile impressions from bone led me to recognize ossification—even commencing—in the sterno-costal cartilages, variations in the thickness of synovia, as well as amount of effusion, infiltrations, rarification, &c., of bones and joints; so that frequently under the bed-clothes and without leading questions, and apart from osteophytes or irregularities of outline, one could diagnose old gouty attacks, &c. I remember also the pleasure with which I found myself able to—generally—diagnose pleural effusion from lobar pneumonia (though much less certainly from pleuro-pneumonia) by the feel and the resistance of the part. I began, also, to rely upon picking up the outer border of the heart, the upper border of the liver, &c., in the same way. For some time, also, I had been experimenting with the feel of muscles, poor, normal, degenerated, slightly or acutely spastic, and the relationships, reflex or direct, with related structures or organs. Gradually I found that a large volume of very valuable evidence was thus forthcoming, frequently of a sort that, under other procedures, I had previously missed.

I had found, also, that in reference to dulness and increased resistance the best results were obtained by a mixture of palpation and percussion, drawing the percussed finger lightly towards, over, and away from the surface, and at the same time percussing with a variable amount of strength according to the normal known conditions of the part, but generally very light.

Most of this was, of course, over and above the usual procedures described by authorities such as Da Costa in the orthodox physical examination of pulmonary, cardio-vascular, abdominal, and other conditions by ordinary palpation, percussion, and sense of resistance, and its inculcation has been part of my ordinary clinical teaching for some years past.

It was at this stage that I came to know Pottinger's work ("Muscle Spasm and Degeneration in Intrathoracic Inflammations and Light-touch Palpatation"). He deserves the credit of maintaining and extending the practice and value of light-touch palpation, coupled with the sense of resistance. As already mentioned, I personally feel more at home with variable percussion of the finger. It is kept lightly moving over the different areas. By this means he outlines the cardiac borders, the lungs and many of their lesions, differentiates heart from liver, outlines the stomach, spleen, and liver, many mediastinal tumours, &c., in a way and to any extent not generally attempted. He was also apparently the first to lay special stress on this means of diagnosing from degenerative and spastic conditions of the sterno-mastoid, levantor anguli scapuli, trapezius, and rhomboid muscles, chronic and acute lesions respectively in the upper part of the same lung. Since reading his work I have paid some attention to it in this connection, but do not feel competent yet to give a definite opinion. With most of his other views, however, I find myself in accord.

From my own experience, therefore, as well as from these general considerations and the experiences of others, I submit that much greater attention than is at present given might well be shown both educationally and clinically to the sense of touch; that its present haphazard clinical application should be replaced by thorough, systematic training; and that the tactus eruditus, which comes with experience through such training, may thus be made the means of obtaining always important, and at times invaluable, information in an ever-increasing number of diseased conditions—information which may not be procurable in any other manner.

What might not we achieve if we could but apply fingers such as those of Helen Keller to clinical medicine and surgery!

AUDITORY REPRESENTATION OF HEART-SOUNDS.

By J. W. Springthorpe, M.A., M.D.,

Senior Physician, Melbourne Hospital.

By careful auscultation it is possible to ascertain auditively not only the normal conditions of heart muscle, valves, and cavities, but also any abnormal accentuation, its cause and concomitants, any abnormal state of the local muscularity and its character, the presence and character of bruits, and the synchronous or asynchronous action of the two sides. For their representation I have evolved the following:—

Represent muscularity by the vowel *u* and the consonant *b*—e.g., *ub;* its increase, by changing the vowel into *oo*, or by doubling the consonant *bb*, one or both—e.g., *oob, oobb;* its diminution, by replacing the *u* and the *b* by *i* and *p*, one or both—e.g., *up, ib*.

Represent valvularity by the combination of the vowel *i* and the consonant *p*—e.g., *ip*.

Represent reduplication by doubling the vowel and the consonant, one or both—e.g., *u-ub, ubub, ip, ipip*.

Represent accentuation by doubling the consonants—e.g., *ubb, ipp;* or by an introductory *h*—e.g., *hub, hip;* or by both—e.g., *hubb, hipp*.

Represent an obstruction by *r;* if marked, by *rr;* if presystolic, in front of the *ub*—e.g., *r-ub, rr-ub;* if diastolic, after the *ip*—e.g., *ip-r, ip-rr*.

Represent regurgitation by *f* in place of *b* or *p;* at the end, if audible only towards the end—e.g., *uf-if;* or both before and after, if continuous throughout the sound—e.g., *fuf-fif;* or if marked, by double, *ff*—e.g., *fuff, fiff*.

Represent delay in the second sound by a line instead of a dot between the two, the length of the line being proportioned to the amount of the delay—e.g., *ub–ip* instead of *ub.ip*.

TABLE.

Sound.	Uncomplicated.	Accentuation.	Reduplication.	Obstructive Bruit.	Regurgitant Bruit.
First sound—				(presystolic)	
Normal	*ub*	*hub, ubb, hubb*	*u-ub, ubub*	*r-ub, rr-ub*	*uf, fuf, fuff.*
>Muscularity	*oob*	*hoob, oobb, hoobb*	*oo-ub, oobub*	*r-oob, rr-oob*	*oof, foof, fooff.*
<Muscularity	*ib*	*hib, ibb, hibb*	*i-ib, ibib*	*r-ib, rr-ib*	*if, fif, fiff.*
	up	*hup, upp, hupp*	*u-up, upup*	*r-up, rr-up*	*if, fif, fiff.*
Absent	*ip*	*hip, ipp, hipp*	*i-ip, ipip*	*r-ip, rr-ip*	..
Second sound—					
Normal	*ip*	*hip, ipp, hipp*	*i-ip, ipip*	*ip-r, ip-rr*	*if, fif, fiff.*
Delayed	*ip*	..	..	(diastolic)	..

RHEUMATOID ARTHRITIS.

(Discussion opened by Professor COLQUHOUN, M.D. Lond., F.R.C.P. Lond., Professor of Medicine, Otago University.)

I SUPPOSE we have all in the course of practice been puzzled many times with cases of acute and chronic affections of joints, and we have probably sought for guidance from many sources, especially from the work which has come to us from the physicians at Bath, beginning in 1804 and 1805 with Heberden and Haygarth, and continued by the Garrods, Spender, Armstrong, Bannatyne, and Wohlmann, and Blasoll, and more recently by Llewellyn Jones and many others.

It is with profound respect to these observers and writers that I venture to open a discussion to-day on rheumatoid arthritis, for, notwithstanding all that has been written on the subject, perhaps partly on account of the multitude of opinions expressed, there is still much doubt as to the definition, pathology, and etiology of the disease or diseases known by that name.

Even if our discussion should add nothing to the general sum of knowledge, it ought at least to help us to a clearer notion of the problem and it difficulties.

First, it is necessary to define what we mean by rheumatism. I accept as rheumatic acute and chronic articular affections, and some probably muscular and fibrous, which can be influenced by salicin and its derivatives. I accept also the opinion so ably advocated by Payne and Poynton—that these affections are caused by the *Diplococcus rheumaticus*, using "cause" with the ordinary limitations. There are, as is the case with other infections, necessary accessories of which we know little, such as heredity, personal predisposition, and local accidents.

The term "rheumatoid" may be applied with etymological accuracy to any disease of the joints which resembles rheumatism. I am inclined to think that in the present state of our knowledge it is the safest term to use for many forms of joint-affection, adding such qualifying adjectives, tubercular, syphilitic, septic, &c., as investigation may suggest and support. This is partly anticipating the result of the discussion, and we have still to ask if there are any recognizable appearances and symptoms which belong to one class of joint-trouble and to it only, and which may be called by the term "rheumatoid," using that word in a specific sense, as we use the word "typhoid."

I think that question has been answered in the affirmative rather too positively. The rheumatoid condition is described as beginning usually in the small joints. The fingers become fustiform and tender, the skin is white and becomes thinned or pigmented, the muscles atrophy more than disease accounts for, there is pyrexia more or less constant, there may be tachycardia. The disease is symmetrical, progressive; as it goes on the number of joints attacked increases. Finally nearly all the joints of the body may be made useless, some anchylosed, some dislocated, all deformed. Subjectively the patient complains of pain, of heat, and other sensory disturbances. These symptoms may extend over years, ending in complete crippling, but when once that is attained there may be many years of quiet and restful life before the patient.

An X-ray examination of such a case shows that there is no increase in bony tissue, but regularly an atrophy of bone. Helpful as the X-rays are, they do not serve to give a complete diagnosis. They do, however, differentiate osteoarthritis and gout from other rheumatoid conditions which show no increase in bony growth and no deposits in and around joints.

If we now come to the discussion of the theories which have been advanced to account for these cases of arthritis and periarthritis we may separate them into the chemical, the bacterial and toxic, and vital.

Sir James Barr, of Liverpool, advocated the frankly chemical origin of rheumatoid arthritis in an interesting paper contributed to the *British Medical Journal* last year (1913). He states his belief that the proximate cause is a mild acidosis of the blood which leads to the absorption of lime from the bones and other tissues. As the disease he describes begins usually in the large joints and only secondarily attacks the small ones, it is doubtful if he is not dealing with cases of osteoarthritis, a condition which by general consent is not considered now by most physicians and pathologists to have any relation to rheumatoid arthritis. As he describes also many phenomena which are found in typical rheumatoid cases, and claims to have treated successfully many of them by the administration of lime salts, the chemical theory is obviously one which will have to be tested by further observation and experiment.

The late Sir Jonathan Hutchinson may be claimed as at least partly supporting the chemical theory. He has described in his clinical studies some cases of apparent rheumatoid arthritis in which uric-acid salts were found on the cartilages, and suggested that these were true cases of rheumatic gout or a combination of rheumatism and gout. While it is possible that the gouty diathesis may coexist with some of the other conditions which cause arthritis, it is now generally held that the uric acid in excess is not usually associated with those conditions known as rheumatoid.

It is, however, certain that many cases of gout in joints give rise to difficulties and errors in diagnosis. My own experience is that the condition described by patients as "rheumatic gout" is nearly always gout pure and simple.

The bacterial and toxic theory is undoubtedly at this time the first favourite, and with good cause. It seems certain that there is hardly a pathogenic organism inhabiting the human body which may not attack the joints either directly or through its toxins. If the organism is virulent its destructive effects are so severe and rapid that there is usually little difficulty in diagnosis; but when the virus is attenuated there may be produced a condition of chronic arthritis which is extremely difficult to place. Take, for example, a case described by Mr. Arbuthnot Lane before the Royal Medical Society last year. He treated successfully a young woman suffering from obstinate constipation by operating on the colon. Incidentally he cured her of a condition of rheumatoid arthritis of some years' standing. Mr. Lane gave no details of her condition, but we may assume that so skilled an observer was not mistaken, and that the patient had suffered from a joint-affection resembling rheumatism but not amenable to treatment by ordinary methods. As a cure took place when the source of infection was removed it is likely that the joint-affection was caused by toxins rather than by bacteria.

Even if no other cases of intestinal infection had been recorded, and there have been many, I am prepared to accept this case as a genuine one of rheumatoid arthritis, using the phrase in a general sense; but I would add to it "of intestinal origin," to make the description clear. I do not, however, accept that or any other septic infection as a sufficient explanation of the greater number of cases of rheumatoid arthritis. There are innumerable analogous cases on record—cases where the infection has been traced to the nose, the mouth, the gums, the kidneys, bladder, urethra, and genital track; and where the removal of the source of infection has brought about a cure of the arthritis. I will cite another case in my own experience. A good many years ago, before the days of X-rays or other modern methods of exploration, I had a patient with pyuria, and I felt pretty sure that the pus came from the left kidney.

Surgeons were rather more shy then of opening the abdomen and making exploratory incisions than they are now, and as I could not persuade any surgical colleagues to cut down on that kidney, I passed in a long needle under the last rib and struck the pelvis and drew out some pus. Within twenty-four hours the man developed pyrexia, and an extensive polyarthritis resembling acute articular rheumatism, but which was unaffected by salicylates. An operation was performed, a stone removed from the pelvis, and the kidney drained. The arthritis quickly disappeared. That case satisfied me that, given the introduction into the blood-stream of pus from the urinary passages, a rheumatoid condition could be induced.

The commonest form of septic arthritis is the gonorrhoeal. Given a frank attack following gonorrhoea, the disease is easily recognized; but we have all seen cases which suggest that the condition may easily become chronic or intermittent, and continue so long after the original infection that its cause is easily overlooked. I need not cite cases, as our time is limited.

It is well known that syphilis, both hereditary and acquired, may be a cause of a rheumatoid condition. In children it attacks especially the epiphyses; in adults both the soft and bony tissues. With recent improvements in methods of diagnosis these cases are less difficult than they used to be, but they are still pitfalls for the unwary.

In young children scorbutus produces a condition which is distinctly rheumatoid. The swelling about the joints, the tenderness, the pyrexia, the anaemia, and malnutrition of such children have often led to erroneous diagnosis; but when once attention was called by Barlow and others to its causation and treatment the difficulties in diagnosis disappeared.

Tuberculosis of joints is another condition which must be considered. The ordinary tubercular diseases of joints, like other acute septic infections, rarely give rise to trouble in diagnosis, at least when the disease is fully established. But as with the other septic conditions, there may be an attenuated virus which may produce a rheumatoid affection of less intensity but enduring and dangerous to the integrity of the joints.

This view has been long held in France, and has been especially advocated by Poncet and the Lyons school. A recent communication by Dr. Lyle, of New York, to the New York Medical Society, which appeared in the *Annals of Surgery*, May, 1912, recapitulated Poncet's views, which practically claim for tuberculosis the whole rheumatoid territory. It is maintained that 40 to 50 per cent. of the cases of chronic arthritis deformans of old age can be shown to have tubercular lesions, and that a large percentage of the rheumatoid affections of childhood and maturity are cases of tubercular rheumatism. Dr. Lyle says that Poncet and the Lyons school have advanced bacteriological, pathological, and clinical proofs of their contention. Here there is the obvious difficulty that in a disease like tuberculosis, which is believed to be present in 90 per cent. of urban population at the age of ten, there is no other disease, epidemic or otherwise, which may not be concurrent with it. How can we say in what cases tuberculosis is a cause and not merely a coincidence? Consider a disease like measles. It has been long taught that measles is likely to lead to tuberculosis of the lung. Is it not more likely that measles only wakes up, in an already tubercular patient, disease which has previously existed in a latent form? And so in rheumatoid conditions we may be prepared to acknowledge that they may arouse tubercular predispositions or have tubercular infections grafted on to them, without recognizing such infection as being a primary cause of the condition.

While I believe that some rheumatoids are tubercular, I do not think that this is the solution of the problem. The Lyons school has done good service in calling attention to this side of the question. As a matter of diagnosis it will now be more necessary than ever to consider in individual cases the possibility of an attenuated tuberculosis virus or toxin being concerned.

The influenza bacillus has, among its other activities, occasionally been busy with the joints, tendons, and muscles. In the epidemics described in Liemssen there is a casual reference to rheumatic symptoms, and in the more recent pandemic in some years, especially 1906, rheumatoid symptoms were a good deal in evidence.

Llewellyn Jones quotes a case in which the influenza bacillus in pure culture was found in a suppurating joint. Other cases with slow arthritic symptoms have been described, and it has been especially noted that influenza attacks have had a very bad effect on patients already suffering from arthritis. Here, as with tuberculosis, the widespread nature of the epidemic makes it certain that there must have been cases of arthritis following attacks of influenza, or coincident with it, without any causal connection.

In any case, granting that there may be an influenzal rheumatoid condition, this infection can only play a very small part in the whole etiology of the disease.

Apart from these different infections which may attack joints, it has been maintained by many observers that true rheumatoid arthritis is a disease produced by a specific organism. I am not a bacteriologist, and I consider it fortunate that I am to be followed in this discussion by Dr. Herbert who is not only one of the original observers in this direction, but who has a wealth of experience, drawn from English and New Zealand sources, of the various arthritic diseases which none of us can even approximate to. It is obvious, however, to us all that those who believe in the specific nature of the disease are not agreed among themselves as to the nature of the organism which produces it. I am not inclined to accept that theory, at least not as a complete explanation of the etiology of the disease, but I shall listen with interest to the facts and arguments which may be advanced in its favour, and with a mind as open to conviction as I can make it.

I now come to what for want of a better name I have called the "vital theory." By that I mean an attempt to explain the phenomena of rheumatoid arthritis, apart from septic cases, by changes in the nervous system either primary or as a result of pathological conditions in the secreting-glands of the body, or by such changes alone.

That the disease may be a primary nervous disorder has suggested itself to many observers. Cerebral, spinal, and peripheral nerve-lesions may all produce trophic lesions in the periphery which have analogies to those found in rheumatoid arthritis; in hysteria we may get effusion into joints; in locomotor ataxy we occasionally get atrophy of bones, joint-destruction, and ulcers; in chronic poliomyelitis we get muscular and other atrophies; in syringomyelia, muscular atrophy and trophic changes in skin, nails, &c.; in injuries to nerve, atrophy of muscles, skin, &c.; but pathological anatomy does not support a theory of gross organic changes in the nervous system as the cause of rheumatoid disease. The degenerations which have been described in the anterior cornua of the cord are at least as likely to be a result of the myoarthropathies as the cause.

We cannot on these grounds dismiss the theory of a nervous causation. We know that in the performance of their functions the various parts of the nervous system are capable of being profoundly influenced by various toxins introduced from without or developed within the body, or by the want of some internal secretion which should be present in the blood, or by the excess of such secretions. The most familiar instance of the result of an excess or diminution of a normal secretion is to be found in the thyroid gland.

We may now follow this line of argument, and try to find if there is any gland in the body which may be suspected in connection with rheumatoid arthritis, as the thyroid is in myxoedema. If we look at any statistics of cases we shall find that there is an enormous preponderance of the female sex in them all. Garrod's 500 cases consisted of 411 females and 89 males, or about 79 and 21 per cent. Many of the males were cases of osteoarthritis-monoarticular attacks or cases in which several of the large joints were chiefly affected, and this condition is not under discussion. Llewellyn Jones in a series of 240 consecutive cases noted that 39 were males and 201 females, or 16·25 and 83·75 per cent. male and female. Out of twenty cases which were treated last year by Dr. Carmalt Jones, 17 were females, 3 males, or 85 and 15 per cent.

Wherever we get our statistics we get the same result. Out of 128 cases in females recorded by Llewellyn Jones, 121 began between the ages of fifteen and fifty; out of 77 cases of Garrod's, 67 began between the same ages, 64 between twenty and fifty.

Not only is there a large preponderance of the disease among females, but there is the additional fact that these cases occur chiefly among women during the period of reproductive activity, and at the decline of that function. In children there is the same set predisposition, but it is noticeable that very few cases comparatively occur in childhood, and then the disease is often accompanied by enlargement of glands and sometimes of the spleen, suggesting direct sepsis.

If we now seek for the special conditions under which the disease arises we shall find that in Garrod's cases 19 out of 77, or about 25 per cent., and 35 in Llewellyn Jones's list, or 27 per cent., occurred between the ages of forty and sixty, roughly agreeing with the climacteric period. In the same lists, out of 77, 50 or nearly 65 per cent., and 61 out of 128 or nearly 50 per cent., occurred between the ages of twenty and forty. It may be noted that where Garrod's list shows only 3 cases beginning between fifteen and twenty, Llewellyn Jones's list shows 24 cases, or about 4 per cent., and 18 per cent. of the total number. There is practical agreement between these observers that most of the cases begin when the reproductive system is at its highest state of activity.

If we now turn to these cases in their clinical aspect we shall find facts which reconcile these two statements—viz., that rheumatoid disease tends to appear at the decline of the reproductive period and when it is at its maximum. It will be found that most of those cases which occur early in life belong to the class designated by Armstrong, of Buxton, as utero-ovarian. Cases marked by metritis, menorrhagia, dysmenorrhoea, ovaritis, or some symptoms objective or subjective indicating disordered function of the reproductive system. Many of these patients have had several children in a few years, or they have prolonged the period of suckling, or they have been badly nourished, either from local or constitutional causes. In other cases they have suffered from uterine or ovarian displacements.

We can correlate these two classes, the early and the late, by showing that in both these is probably to be found the same condition—viz., that of ovarian exhaustion.

It is worth noting that many cases occur in practice which fall far short of the disastrous results usually attributed to rheumatoid arthritis. I have seen a young woman crippled in many joints after too frequent child-bearing, yet recovered almost completely after prolonged rest. But it is especially to another class of cases that I wish to draw your attention.

Many women about the climacteric and afterwards suffer from what we may call climacteric rheumatism. This is sometimes muscular, sometimes arthritic, often apparently in the tendons as in connection with the feet, often mixed. Most of these patients recover ultimately under various methods of treatment. Aspirin or some such drug is generally given, but does not affect the condition very much. Time seems to be the chief remedial agent. This form of rheumatism may last for years, may be slight or severe, and in its worst form it does not seem to me to be possible to draw a line between it and the recognizable rheumatoid conditions.

After the artificial menopause produced by removal of the ovaries and appendages, I have seen several cases of well-marked rheumatoid arthritis. If this always occurred the problem would be nearly solved, but it does not any more than after the menopause which occurs naturally.

I do not know of any systematic pathological investigations having been made in the direction of examining minutely the uterus and adnexae in these cases. Rheumatoid arthritis is not a fatal disease, and patients who die of something else show lesions of various kinds which may have nothing to do with that disease. Dr. Katherine Clark has, however, noted that in a girl of twenty-four years she found a total absence from the ovary of germinal epithelium and follicles.

It should be borne in mind that, on the assumption that the disease is due to some disorder of the reproductive system, the primary cause may be in the cerebral or spinal centres, and might easily exist without any gross lesion. I mean by this that the reproductive organs may in some cases be disordered by psychical and other central influences. Reciprocally from organic disease of the peripheral organs may set up changes in the central nervous system, either through the peripheral nerves, or by the action of perverted secretions, or the absence of necessary secretions.

I have said that the nervous theory has appealed to many observers, but I will only quote one recent contribution by Dr. Thomson, physician to one of the Bath institutions on this subject. Speaking of analogies or relations between Grave's disease and rheumatoid arthritis, he says, "In both these exists a strong personal predisposing factor which is enormously enhanced in the female sex, especially during the period of reproductive activity. In both diseases there appears to be some deep-seated metabolic error involving important changes in internal secretions."

I may now venture to formulate certain conclusions, which I place before you tentatively, not dogmatically, because I recognize the complexity of the problem, and believe that we are only at the beginning of our investigation into the ultimate causes of this and other diseases, if indeed we can even hope to reach to ultimate causes in anything :—

1. The joints may be affected by many morbid agencies, chemical microbic, constitutional, traumatic, nervous, and secretory.

2. In this investigation the chief points to be decided are the parts played by microbic infections and vital processes as already defined.

3. Microbic infection may be simple, mixed, or sequent. I may be allowed to explain what I mean by "sequent." If a sugar-containing organic fluid be exposed to the air, it first undergoes alcoholic fermentation by the action of the yeast fungus ; after a time that process ceases and a new fungus, the mycodema aceti, begins its operations. In the human body there are probably similar phenomena. A traumatism is followed by tubercular infection ; that may be followed by streptococcic or other form of morbid activity. This may explain the fact that different observers have found different organisms in the investigation of joint-lesions apparently similar in character. Intestinal and other organisms and toxins may find their way into already damaged joints, different organisms may be present together, or one may follow another in some definite order not yet understood.

4. While the microbic theory may account for some cases of arthritis, and may be a factor in all, it does not seem likely that the enormous preponderance of one sex is a mere accident or to be disposed of by saying that women have less lime in their tissues than men, or by simply using the word "predisposition." There is at least some evidence that the disease is often associated with certain forms of organic disease. I have used the term "ovarian exhaustion," but the fault may lie in the tubes, or the uterus, or parovarian structures, or in that part of the cerebral structure which controls the reproductive organs or is associated with them. The disease has been compared with Grave's disease. I think the analogy is rather with myxoedema. It seems to be associated with a depression of function and not with hyperexcitation. If so, why at the menopause do not all women suffer from rheumatoid ? The answer may be that at the natural menopause there may not be abolition of all the internal secretion of the ovaries, or that in the natural and artificial menopause other glands may take on their functions. The fact that many of these cases show signs of thyroid irritation suggests that this gland has new duties cast on it.

I have tried the therapeutic test of administering ovarian extract in some of these cases, but I can only speak doubtfully of the result. It has never been used alone, and although in some instances there has been improvement it is not possible to say that was due to the extract. It has to be remembered that when extensive disorganization of joints has taken place no recovery is possible. Arrest of the disease is all that can be hoped for. One individual's experience counts for little in any matter of therapeutics, but I am following this line of treatment as opportunity offers.

To sum up, I offer this statement for discussion : that true rheumatoid arthritis is a disease of the female sex, due to some change or changes in the organs of reproduction which at present can only be guessed at, but which are associated with defect, not excess, of function ; and, as a corollary, that cases of rheumatoid in males are probably due to some infection or toxin.

Dr. HERBERT (Rotorua), after congratulating the opener of the discussion on his very lucid paper, said,—Before discussing rheumatoid arthritis it is necessary to make quite clear that we are all referring to the same disease, as the existing confusion of nomenclature has caused a corresponding confusion of ideas, and I am assuming that we all concur in the main in Professor Colquhoun's definition. It seems to me that the title rheumatoid arthritis is as good a one as could be found, signifying a disease "like rheumatism," and no more suggesting a connection with that complaint than is done in the strictly analogous cases of typhus and typhoid. An absolute distinction must be drawn between rheumatoid and osteoarthritis: the former is a subacute disease, the clinical picture of which has just been so ably drawn—a disease more especially of women, and often of young women, and characterized, so far as the bones of affected joints are concerned, by rarefaction of tissue; the latter, which is by no means a disease of young women, being characterized by proliferation of bone. Personally, I look upon osteoarthritis as rather an effort of nature towards repair; material thrown out much as callus is about a fracture; a mechanical condition rather than a disease; an end-product in rheumatoid arthritis, in traumatic arthritis, in gout, and possibly in true rheumatism.

I have searched in vain for any connection between rheumatoid and acute rheumatism. Examination of family histories gave a negative result; again, a personal history of acute rheumatism in rheumatoid patients is absent. Thus in ninety-two consecutive cases of chronic rheumatism I found a history of previous acute rheumatism in seventy-two, while in forty-eight consecutive cases of rheumatoid arthritis I found only two doubtful histories of acute rheumatism.

Diagnosis.—This is absolutely easy in typical cases: the appearance of the hands, the affection of joints of the jaw and neck, the age, the sex, and the other conditions already described make up a clinical picture impossible to mistake. But, on the other hand, there are many borderland cases, some of which are difficult and some quite impossible to label, and I believe that included in these borderland cases will some day be found a whole variety of at present unclassified diseases. In difficult cases—for instance, in some gonorrhoeal conditions—the X-ray picture will generally remove all possible doubt about the diagnosis, and I invariably take a skiagram in doubtful cases. Here, too, the reaction to gonococcic vaccine will often clear up the diagnosis. If you will look at these skiagrams of rheumatoid hands, of gouty hands simulating rheumatoid, and of similar gonococcic hands you will see at once the absolute distinction of appearance of the bones.

Pathology.—The extreme rarity of post-mortem examinations of acute cases accounts for the doubt there is about the pathology, though here we hope for light from the work of the Cambridge Research Hospital. I have just come across an old notebook of mine containing an account of a post-mortem I made on a child with acute rheumatoid arthritis twenty years ago [drawings of sections of bone, &c., handed round]. Occasionally I have found in the fluid aspirated from affected joints cartilage-cells with proliferating nuclei arranged in columns, some five or six in a row.

Aetiology.—[The bacterial *versus* nerve origin was here discussed, and it was pointed out that these were not necessarily antagonistic theories, as a toxin may be formed which has a selective action on joint trophic centres.]

The third possibility of alteration of some internal secretion may even so be an ultimate result of a bacterial toxin.

Treatment.—Except that aspirin will generally relieve pain, I have found drugs—*e.g.*, guaiacol and beta-naphthol—practically useless. I have found most benefit from a nourishing diet, sunshine direct on to the joints, stimulating acid-mineral baths, such as the Priest at Rotorua, electric baths in the form of interrupted primary current, and, with strict limitations, massage.

A few cases have manifestly improved on a stock vaccine of the *Micrococcus rheumaticus* of Poynton and Paine, a most surprising, and to me, looking as I do upon the disease as a definite specific infection, a somewhat disconcerting phenomenon.

Prognosis.—Very bad as regards complete recovery, though a few cases do completely recover. I have here a skiagram of such a case, which I have had under intermittent observation for five years, showing the replacement of rarefied bone-endings by normal bone, with the formation of a few osteophytic nodules—*i.e.*, slight osteoarthritis.

Dr. Springthorpe (Melbourne) said that the scholarly, philosophic, and clinical address of Dr. Colquhoun left little to say, except by way of admiration and agreement. He was glad to find himself, as representing another school and hospital, so much in accord. He certainly preferred to limit the term to a very definite clinical picture, and always tried, at times unsuccessfully, to give another name and interpretation to other forms of arthritis which fell outside the definition. Certainly one of the points which required explanation was the marked incidence upon the female sex and, though to a much less degree, the generative function. He could not give any prominent place, etiologically, to pyorrhoea alveolaris or leucorrhoea. Intestinal infection stood on a different basis, but could scarcely be said to be proven. X-ray diagnosis was also of great service. As regarded treatment, his experience, though less than Dr. Herbert's, extended over many years and a considerable number of cases, and, perhaps from difference in the class, had certainly been more hopeful. Briefly stated, it was rest in bed, full diet rich in protein and fat, frequently a red wine in addition, and a general tonic such as liq. arsenical m. ii-v with syr. ferri iod., ʒi t.d.s. post cib., and locally sulphur (following hot water) and cotton-wool, with the constant current some three times a week—a line of treatment in every way restorative, tonic, and stimulant, and the antithesis of the usual rheumatic. Cases treated before the synovial membrane had been lost frequently seemed cured, and even more advanced cases became at times able to resume ordinary duties and continue them with little or no discomfort for a term of years.

THE DIAGNOSIS OF SMALLPOX, AND THE BEST MEANS OF PREVENTING ITS SPREAD.

By Dr. Monk, of Auckland.

Mr. President and gentlemen, in opening this debate, the results of which will be closely watched by members of our own profession as well as by many of the general public, I wish to state that within the limits of time allowed for a single paper it would be practically impossible to get through the whole question of varieties of smallpox, their diagnosis and treatment, both curative and preventative, therefore I have confined myself chiefly to the early history and origin of the disease, and some points in its diagnosis. I would therefore draw your attention to a few of the characteristics that have struck me whilst dealing with the recent epidemic, and would remind you that the expressed opinions of a body of medical men such as are here assembled will carry much more weight than the opinion of one individual alone. The general public have their own views upon smallpox, and, as the past epidemic does not conform entirely to those views, many of them say, " Nonsense, there has been no smallpox at all," and make remarks of a similar nature. I believe, too, that there are some members of our own profession who are still " doubting," and these I would ask to closely follow the facts I will bring before them.

To start from the beginning : The first intimation that we had in Auckland of any case resembling smallpox was on the night of Saturday, the 10th May, when I received a telephone message from the Superintendent of the Whangarei Hospital that two Natives said to be suffering from smallpox had been sent to that Hospital, but that owing to some mistaken order had been sent away again to their own home. Full instructions were telephoned to Whangarei, and I left by the first available boat to see the cases, who had meanwhile returned to their encampment in the Mangakahia Valley—some thirty miles or more from Whangarei—over roads about which the less said the better. On reaching the camp I examined the two men very carefully, and found upon them pocks in all stages—scabs, pustules, and vesicles. This I pointed out particularly to the Inspector, who was with me, and I quite thought that we had to deal with cases of chickenpox. No other cases were known to exist in that district, and I returned to Whangarei with the idea that we had to deal with cases of severe chickenpox.

On the morning of the 4th June a case was notified from Onehunga, the patient being a Maori, twenty-eight years of age, and a noted athlete. On visiting him I found that the symptoms of the patient bore a much stronger resemblance to smallpox than chickenpox. He was in the eighth day of the disease, and fully pustular. Any ordinary case of smallpox with the amount of pustulation that this man had would have been delirious, running a temperature, and been very ill. The patient complained of a certain amount of discomfort, but chiefly demanded food. He was removed to Point Chevalier Hospital, where he was seen by several medical men, who doubted the fact that he had smallpox. He was covered with a discreet rash resembling smallpox, but had very few constitutional symptoms. The distribution of his rash did not entirely coincide with genuine smallpox, though I must confess that for two days he seemed to have smallpox right enough. Then the scabs, which one would have expected to be a fortnight or more in coming off, cleared away in about four days, and with the exception of a small boil on his knee he was smooth within a week.

After this patient we heard of others, mostly milder in character than the one above noted, and much more resembling chickenpox than smallpox. Cases were heard of in various districts, and the Inspectors reported that they found that vaccinated persons were not being attacked. About this time we heard of the similar kind of epidemic in Sydney, and cases were becoming fairly common in various parts of the

North of Auckland. The effects of vaccination were still being reported upon, and made us alter our opinion to the one that we had a variety of smallpox to deal with, and not chickenpox. Up to this time no cases had been reported amongst the white population, for we did not know then the source of all the trouble, and that the disease had been introduced by a white person to the Maoris.

Inquiries made in the north elicited the fact that a Mormon missionary was the first person to have the rash, and after a little time this gentleman was found teaching a school at a place called Awarua. Details of this man's movements will supply you with the early history of how the disease was introduced and spread. He joined the s.s. "Zealandia" at Vancouver on the 19th March, and reached Auckland on the 8th April. On board this steamer was another man, named Finlayson, who had a few spots upon him, and who travelled with the missionary. This Finlayson is said to have shown the spots to the ship's doctor, who said they were nothing of importance.

To return to the missionary: He reached Auckland on the 8th April and went to a friend's house—Pastor Going—at Ramarama, where he remained for two days. He then went to Te Hora, where a *hui*, or conference, was held. This would be on the 14th April; and on arrival at Te Hora he said he felt very ill, but did not know what was wrong with him until a rash appeared which he thought was measles. The spots became pustular, and appeared upon the face, neck, body, and legs. After a week at Te Hora he went on to Awarua, and at this time scabs and skin were being shed. These dates and facts are all taken from information supplied by the missionary himself, and it is fairly evident that he was infected whilst upon the steamer by the other man—Finlayson. From the *hui* cases were spread right and left. This gives you the history of how the infection was introduced into New Zealand.

The chief points now that I want to draw your attention to are as follows: (1) Race; (2) length of incubation period; (3) prodromal symptoms; (4) eruption; (5) distribution of rash; (6) time of maturation of the pock; (7) pitting or marking. Taking these points in order,—

(1.) *Race.*—By far the larger number of cases in this district occurred amongst the Maoris, hence the name "Maori epidemic."

(2.) *Incubation Period.*—This has proved to be generally about twelve or thirteen days, at times a day or two longer, but it is very difficult to settle the exact time when a person is actually infected.

(3.) *Prodromal Symptoms.*—These symptoms have been fairly constant, and the history that the patient thought he had an attack of influenza was one that was very commonly heard. Vomiting and lumbar pain were fairly constant. Prodromal rashes, such as the triangular rash, often spoken about, were not common.

(4.) *Eruption.*—On the third day of the illness the rash has usually been first noticed. I have later on to refer more at length to the character of the rash, so will not discuss it here.

(5.) *Distribution.*—This has been fairly normal for smallpox. The favourite places were affected in nearly every instance—viz., forehead, along hair, the side of the nose, the back of the wrists, and forearm. Sores were at times complained of inside the mouth at early stages of the rash. On the body I have noticed more than once that the rash was more prolific than is usually the case in smallpox, whilst the lower extremities have been affected in quite the usual way—viz., the amount of rash increasing towards the feet. One feature I did not see exemplified markedly in this epidemic, and that is that parts of the body exposed to pressure had a greater proportion of rash. Others may have noticed it, but I did not, although I looked carefully for it in several cases. This is a very useful symptom when present, and helps in making a diagnosis.

(6.) *Maturation of the Pock.*—It is under this heading that, to my mind, most of the trouble in diagnosis has been caused, especially in the early stages of the epidemic. The rash did not go through its various stages in the manner in which we had been accustomed to see it. For this reason I have contrasted the text-book times of maturation with those seen in the recent epidemic. Taking the course of a single pock through its various stages we get the following result :—

Day of Rash.	Text-book Smallpox.	Epidemic Smallpox.
1	Red spot, hardly raised and in twenty-four hours papular, giving rise to shotty feel	Red spot, rapidly becoming a papule.
2	By end of second, becomes vesicle —at first conical in shape	Vesicle rapidly formed.
3 4 5	Vesicle increases in size, becomes globular, and on fifth day opaline in appearance	Vesicle fully formed and globular in shape, and opalescent on third day, and fully pustular on fourth and fifth.
6 7	Probably umbilicated, contents pustular, and red aureola round pustules	Scabs forming on sixth and seventh days, and beginning to fade off on tenth, or even earlier.
8 9	Bursting and drying of pustules.	

In contrasting the rash, eruption, and maturation, I would draw attention to the following differences in text-book smallpox and the variety we have recently been called upon to deal with, and which I have called "epidemic smallpox." On the first day of eruption—that is, about the third day of the disease—in both types of smallpox the rash is similar—viz., a red spot developing into a papule. In true variola the papule is noticeable at the end of twenty-four hours, and begins to become shotty ; in the recent outbreak the papule was formed more rapidly, and is beginning to become vesicular at the end of twenty-four hours. On the second day in variola the papule has become a conical vesicle ; during the epidemic the vesicles were more globular, and at times were even becoming milky in appearance.

In text-book smallpox, during the third, fourth, and fifth days the vesicle increases in size and becomes globular in shape ; in about the fifth day is decidedly milky in appearance, and commences to umbilicate. During these three days in the epidemic variety the development has been much quicker, and the pock has frequently been seen to be fully pustular on the fourth day, and on the fifth and sixth scabs have started to be formed. After the final formation of the scab a further difference is noticed between the two diseases. In true smallpox the scabs do not begin to fall off until quite the fourteenth or fifteenth day, while during the recent epidemic scabs have been seen falling off plentifully on the tenth and eleventh days, and sometimes earlier.

To sum up the question of the recent epidemic rash, and give its chief characteristic, I should say that its " superficialness " throughout its course was its great feature. Its rapid development and its equally rapid fall are in marked contrast to the usual variety of smallpox. In very many cases the true skin is not invaded at all, and in one case I saw, which had been fatal, when the scabs were touched the epithelium slid off, taking the scabs with it, and leaving the true skin beneath without a mark.

This brings me to the question of pitting and scarring. You are all quite familiar with the appearance of a person who has suffered from genuine smallpox. In very few instances indeed have deep pits been seen during the past epidemic. Where the cases have approached the confluent type of the disease pitting has followed, but in the general run of cases the mark left has been a red stain, rapidly changing to a whiter colour, and giving rise to a peculiar spotted appearance to the Maori. Frequently in the centre of this stain a small dark spot shows up, consisting of the pigment from the skin, localized in no place ; and on examining patients who have recovered for some time this black spot still remains.

I had the opportunity last week of examining a patient who was ill in June last, and on his forehead, the sides of the nose, and on the wrists the dark spots about the size of a large pin's head were clearly seen. The maculated appearance which some Natives presented was a cause of much trouble in the early days of the epidemic, as people who saw it at once thought that the person was suffering from smallpox at the time, and did not know that it was a recovered patient instead of a sick one.

Having gone through the history of its introduction into New Zealand and the chief characteristics of the complaint, we can now, I think, go a step further, and give the reasons why it has been decided that the epidemic was smallpox. For the following reasons :—

(1.) The prodromal symptoms are those of smallpox.

(2.) The day of eruption of the rash is that of smallpox.

(3.) The characters of the rash are those of smallpox, although modified and accelerated.

(4.) The behaviour of the complaint towards vaccination.

(5.) And I consider this a very strong reason : The fact that amongst the mild cases far removed from any chance of being infected by any other species of smallpox there have occurred rapidly fatal cases, having all the signs and symptoms of haemorrhagic smallpox.

(6.) Amongst pregnant women suffering from smallpox abortion is very common. A European woman admitted to the Hamilton Hospital in this condition was suffering from a sharp attack of smallpox. She had a miscarriage and gave birth to twins, both foetuses showing distinct pock-marks. The marks are seen on the palms of the hands and soles of the feet, and the scalp and body generally. The mother was unvaccinated, had a fairly severe attack, and recovered, but with the usual marking. There is no possibility of this being a case of anything but smallpox, and as it occurred during the course of the epidemic I think if any stronger confirmatory evidence is required to convince any one of the true nature of the complaint the only course open will be to inoculate the unconvinced person. Dr. Douglas has kindly brought these specimens from Hamilton, so that members can see them for themselves.

The above notes give a fairly clear history of the disease in New Zealand, and it may be interesting to hear the experiences of people in other parts of the world. In September last year a paper was published by Dr. Chapin, of the Health Department, Providence, Rhode Island, and a few extracts from this paper are interesting. He states that a mild variety of smallpox has existed in America since 1896, with a very low mortality. It was first mistaken for chickenpox, or some new disease, and was called "Cuban itch," "Spanish measles," "Philippine itch," "nigger itch," "waterpox or swinepox," besides a whole list of other names. It was supposed to have been brought to America by soldiers returning from the Spanish War, but he goes on to say that the disease had certainly appeared before war with Spain was actually declared. He states that throughout these years the mild type has kept its characteristics and has not tended to increase in severity. I think I may say that the same may be said in New Zealand. Dr. Chapin quotes in 1910 3,875 cases, with eight deaths, equal to a mortality of 2 per cent., and in 1911 3,294 cases, without a single death.

The disease cannot be smallpox, because there are so few deaths, and in a community like the Maoris if it were smallpox there would be numbers of deaths; and they generally instance the heavy mortality of new diseases of a febrile type when introduced amongst a coloured race! In answer to this I say that the above is exactly what has happened. This mild epidemic has not been fatal to white people, whilst amongst the Maoris we know for certain of about thirty deaths, and there were probably many more about which we had no information, as the registration of deaths is not compulsory amongst them.

In one part of his report Dr. Chapin says, "Wherever this mild type of smallpox has appeared there has usually developed a controversy as to its nature. The public and general practitioner consider smallpox a serious disease, and they are loath to believe that an affection so mild as is usually observed in this type of disease can be smallpox." This statement is, I think, quite true for New Zealand.

Compulsory Vaccination.

Time will not allow me to go into detail of the methods adopted to stamp out the disease, but there is one lesson that I think needs mentioning. This is the necessity for compulsory vaccination throughout the country. When communication between New Zealand and other countries took weeks instead of days, compulsory vaccination was not so necessary, but now that the times between ports have been so reduced the enforcement of vaccination should certainly be considered. In the report mentioned above by Dr. Chapin he says that Central America and Mexico are homes of smallpox. With the opening of the Panama Canal New Zealand will be brought into closer touch with these regions, which is, I think, another reason for more vaccination.

NATURE OF THE RECENT SMALLPOX EPIDEMIC IN AUSTRALIA: MICRO-BIOLOGICAL FINDINGS AND EXPERIMENTAL TESTS.

By J. Burton Cleland, M.D., Ch.M., and E. W. Ferguson, M.B., Ch.M. (Sydney),

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There has been some discussion and doubt in certain quarters as to the exact nature of the recent variola-like epidemic which has occurred in New Zealand and New South Wales. Whilst the various Health Authorities in Australia and New Zealand are all agreed that the disease was smallpox or variola, some medical men have considered that the epidemic was a distinct entity separable from smallpox and chicken-pox. They, and probably quite rightly, considered it to be "alastrim," but the evidence available in connection with this disease "alastrim" in America seems to indicate that it is unquestionably a form of small-pox. That our disease is also a form of true smallpox we have the following evidence to submit in proof thereof.

General Considerations.

The identity of different manifestations of any particular disease is acknowledged when the same specific micro-organism is found to be responsible for the differing effects. Thus in different epidemics of any infectious disease you may have increased or diminished virulence and special manifestations particular to one or the other. An epidemic of plague may be entirely pneumonic or entirely bubonic, yet no one considers that in consequence we are dealing with two separate diseases. Scarlet fever as at present known in Australia is a comparatively mild complaint, thus differing from the severe epidemics known years ago elsewhere. Whilst in individual cases of disease in the epidemic the effects on the patient will vary according to the soil in which the organisms are planted, the seed being of the same strain in each case, in the various epidemics we have a superadded feature, and that is variation, little or great, in the nature of the organism. All living creatures vary more or less in each new generation. Where countless generations occur in the course of a few days the variations might be expected to be great. Strange to say, however, as regards the organisms of infectious diseases in man the various generations seem to breed true to a remarkable extent in spite of such ample opportunities for differing. Naturally in many cases the only indication we have that they do breed comparatively true is in the organisms producing a very similar condition of disease in their hosts in different epidemics. It is a matter well known, however, that whilst some epidemics of infectious diseases are inordinately severe, others are remarkably mild in spite of the soil being presumably almost identical in each case. If, therefore, one epidemic is decidedly milder, with a negligible mortality, than another, we have no grounds for supposing that merely because it shows these features it is not due to the same disease and the same specific organism as are responsible for the other epidemic with very severe symptoms and a heavy mortality. The mere mildness of the recent epidemic in New Zealand and New South Wales cannot, therefore, alone be considered as indicating that it was not due to the same specific organism as that producing the more fatal smallpox of the Far East. It may be well here to point out that in a general way it is of no advantage to a disease-germ to kill or incapacitate its host, as thereby its survival in nature may be rendered the more precarious. It is to the interests of the invading organisms and of their host that, as far as possible, they should all live together in peace and concord, that the invading organism should harm its host as little as possible, and the host injure the invaders not at all.

There are now recognized a few diseases which are due to ultra-visible viruses of unknown nature. We would be perfectly unaware of the existence of such viruses were it not that during their life-histories in the different hosts they injuriously affect these to a greater or less extent. It is possible that a number of slight complaints which merely incommode for a few hours or days their respective hosts, as for instance many highly infectious febrile complaints, may be due also to ultra-visible viruses, and that, further, we and other animals may be surrounded and, in fact, living in symbiosis with vast armies of such organisms, which in the course of ages have so accommodated themselves to their hosts that they produce now no recognizable ill effects. The organism responsible for variola is probably closely allied to this group.

From these observations it will be gathered that there is probably a tendency for all virulent diseases in the course of ages to become less virulent, mutation in this direction being of advantage to the organism by enabling it to multiply more freely. Therefore from time to time in such diseases as smallpox, measles, and scarlet fever we should expect to find milder forms arising by such mutations, and maintaining themselves in the community more easily than the virulent forms. The present epidemic of smallpox we take to be an instance in point.

Vaccinia, the Present Epidemic, and Smallpox.

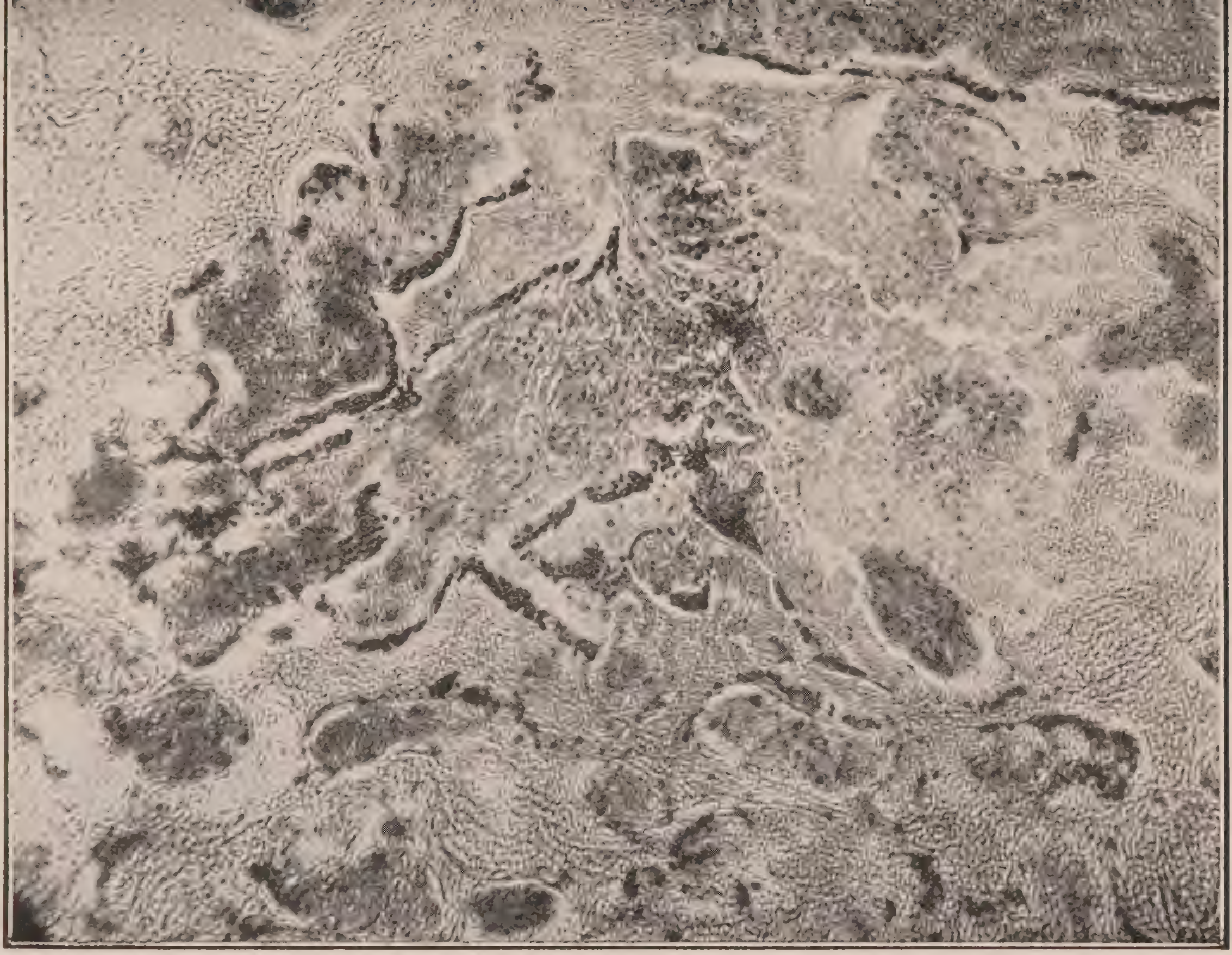
Consideration has at times been given to the question as to whether cowpox is due to the same specific organism as that producing smallpox in man, whether it is a variant of this, or whether it is sufficiently distinct to be ranked as a different species, and yet sufficiently close to be able to produce in its host antibodies capable of protecting against smallpox, this being due to the two organisms having a common ancestry. That cowpox is actually due to the same specific organism as smallpox seems to be conclusively proved, however, by the fact that material from smallpox patients can be conveyed to calves, and that after a few generations in these animals it produces a disease in them transferable back to man, whose course is now identical with that of the natural disease cowpox. In other words, at will the disease smallpox can be converted into cowpox, though the converse cannot be brought about. We are in the dark at present as to how the high contagiousness of smallpox is thus lost on transmission to the cow. It has been suggested that in the complicated life-history of the organism only a certain phase is capable of taking place in the cow, and that once this loss has been achieved for a few generations the hereditary tendency for it to reappear on conveyance back again to the human host is lost. This question, however, is beside the question before us.

The cases seen in the present epidemic seem to us to exhibit a half-way house between ordinary severe smallpox and vaccinia. Though the disease is contagious, it is not so markedly so as ordinary smallpox. Though the patient may be covered from head to foot with pustules, the secondary fever is remarkably mild when compared with semi-confluent or ordinary smallpox. The large number of cases in which only a few pocks developed indicate that the white race has a comparative immunity to this disease as compared with ordinary smallpox, but that this immunity is less than that to generalized vaccinia. The impression has also been left upon us that the skin-lesions are less deep than in ordinary smallpox. By analogies, therefore, with vaccinia the conclusions we seem justified in coming to are these: That the present epidemic is due to the same specific organism as smallpox, that it is probably due to a mutational change in this organism by which its virulence is diminished and possibly some phase of its life-history eliminated, and that it is probable that it is unlikely to recover the general intense virulence of ordinary smallpox.

Cytorhyctes variolae.—During the course of the epidemic opportunity has been taken to search for the supposed parasite of smallpox—*Cytorhyctes variolae.* Various investigators have detected in the epithelial cells, and also in the nuclei of these cells, various bodies which they have considered as foreign to the host-cells, and as representing either actual parasites or a reaction in the cells to the presence of such bodies, the parasite itself being hidden as under a cloak in the centre of the reactionary area (*Chlamydozoa*). Unfortunately, all the cases in which it was possible to obtain material showed already considerable leucocytic infiltration of the pocks. As the supposed parasites are most easily recognized in the stage preceding this, investigations in this line were naturally hampered. Nevertheless, in one case, by Ross's new jelly method of investigation of living cells, bodies were seen in the protoplasm of what appeared to be epithelial cells identical with the descriptions of *Cytorhyctes variolae.* Unfortunately, there is no distinctive reaction of these bodies, as for instance in the shape of chromatin, to specifically identify them as organisms and not cell-products. One cannot therefore be certain that the bodies seen were not degeneration products of the cells. In preparations made by the wet method of fixation, either by osmic-acid vapour or by corrosive sublimate—acetic acid—and stained with iron haemotoxylin or Giemsa's stain, nearly all the cells met with consisted of leucocytes. In these cells foreign bodies were also seen from time to time which may have been engulfed *Cytorhyctes*, or may have merely been further degeneration products.

Tissues from Smallpox Patients.—The tissues that we have had an opportunity of examining have consisted of pocks from the skin, and the placenta and some of the organs of a patient who died suddenly during the course of delivery on the fourth day after the eruption had first appeared. The following is a description of the appearances met with :—

Pocks in the Skin : Sections through a pustule showed areas of various sizes in the skin, as a rule larger near the surface, and extending to the rete malpighii, due to the separation of the epithelial cells by a transudation of lymph accompanied with an exudation of a leucocytes. In some instances the pustule was broad and almost as wide near the rete malpighii as at the surface ; in other cases it showed a more wedge-shaped arrangement with a wide base narrowing towards the apex, showing a kind of radiating appearance. In the deeper pustules vesiculation had separated the malpighian cells from the cutis vera, but did



Placenta from Smallpox Patient, showing Normal and Degenerated Villi.

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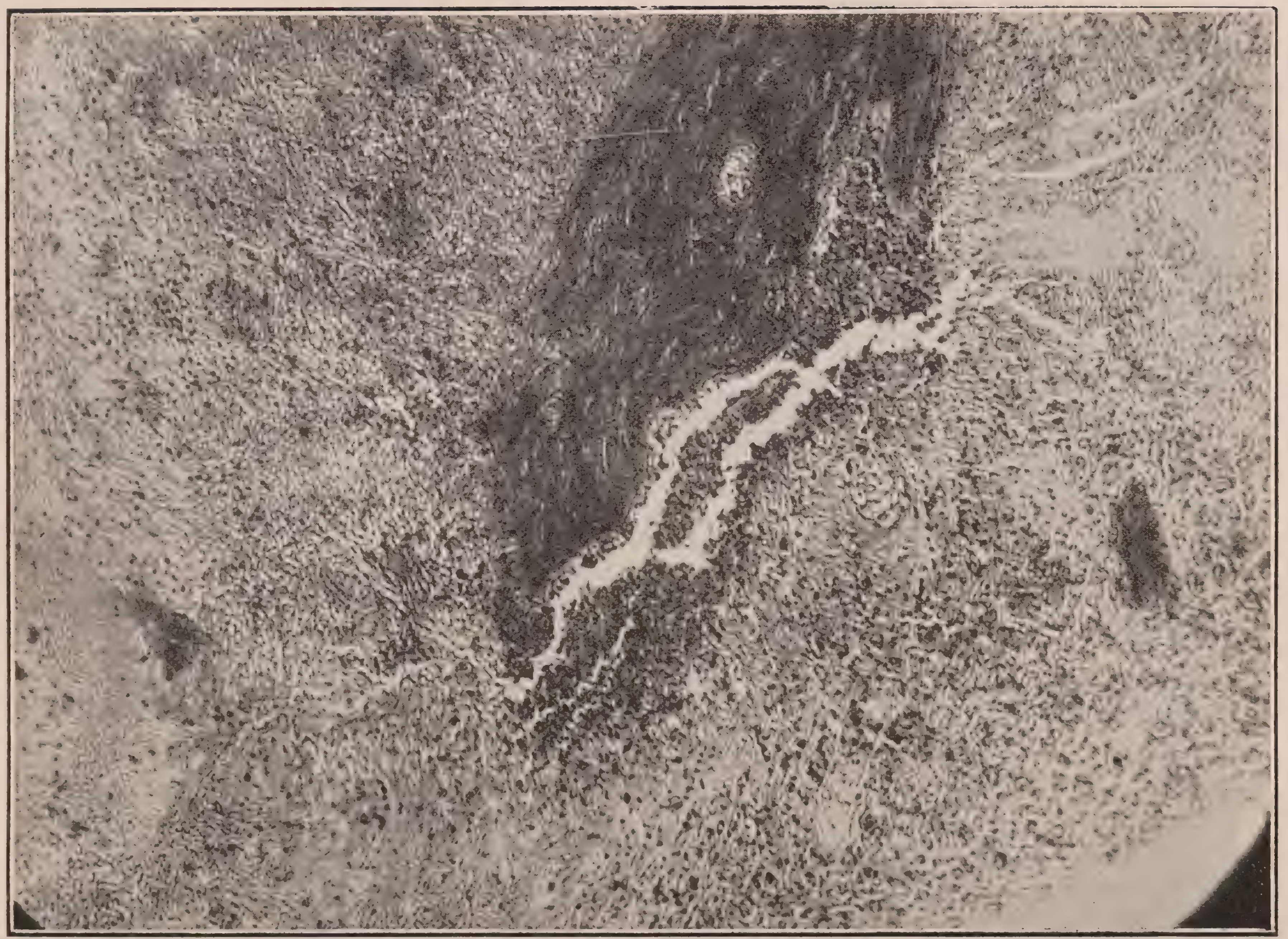
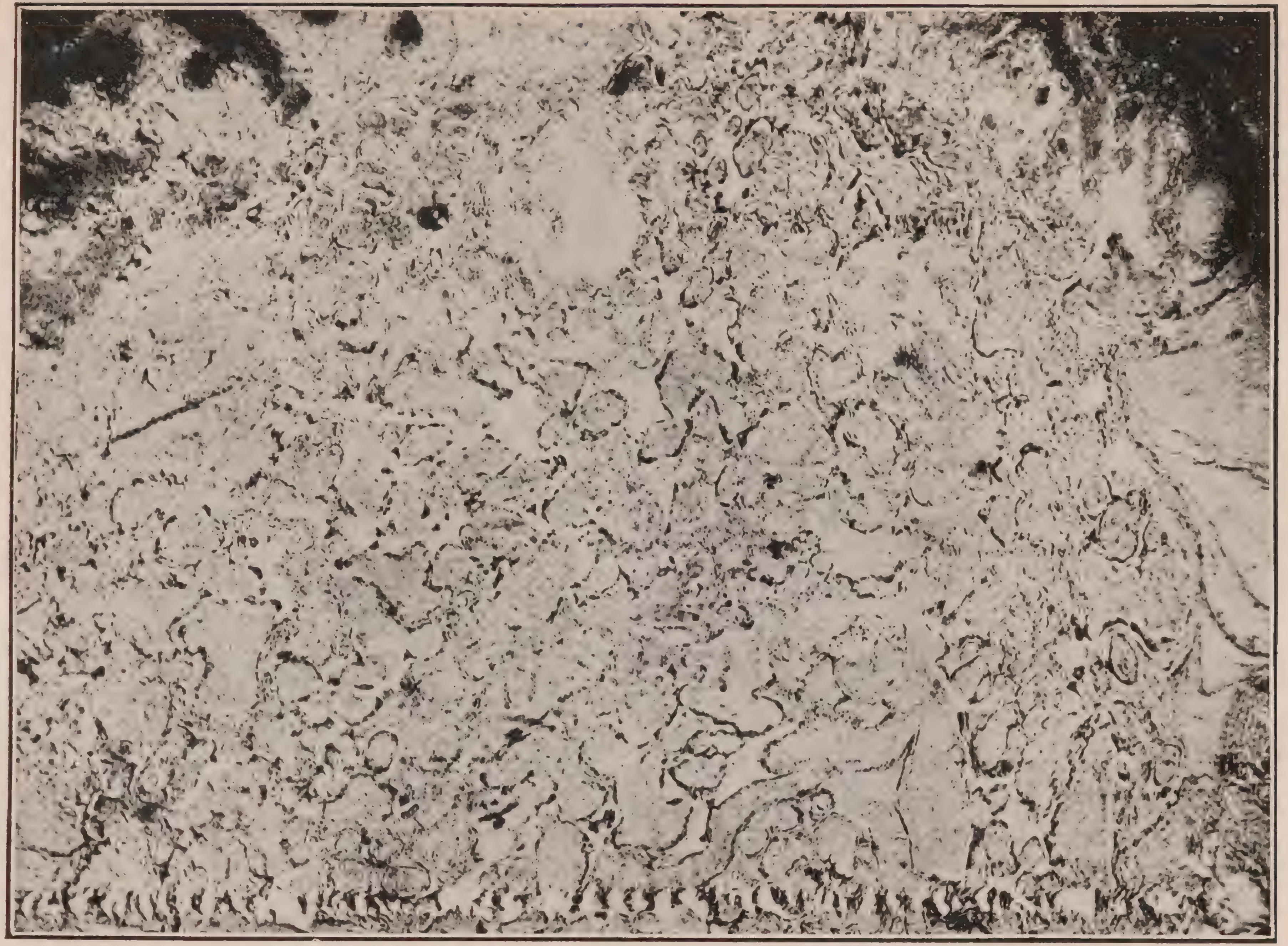
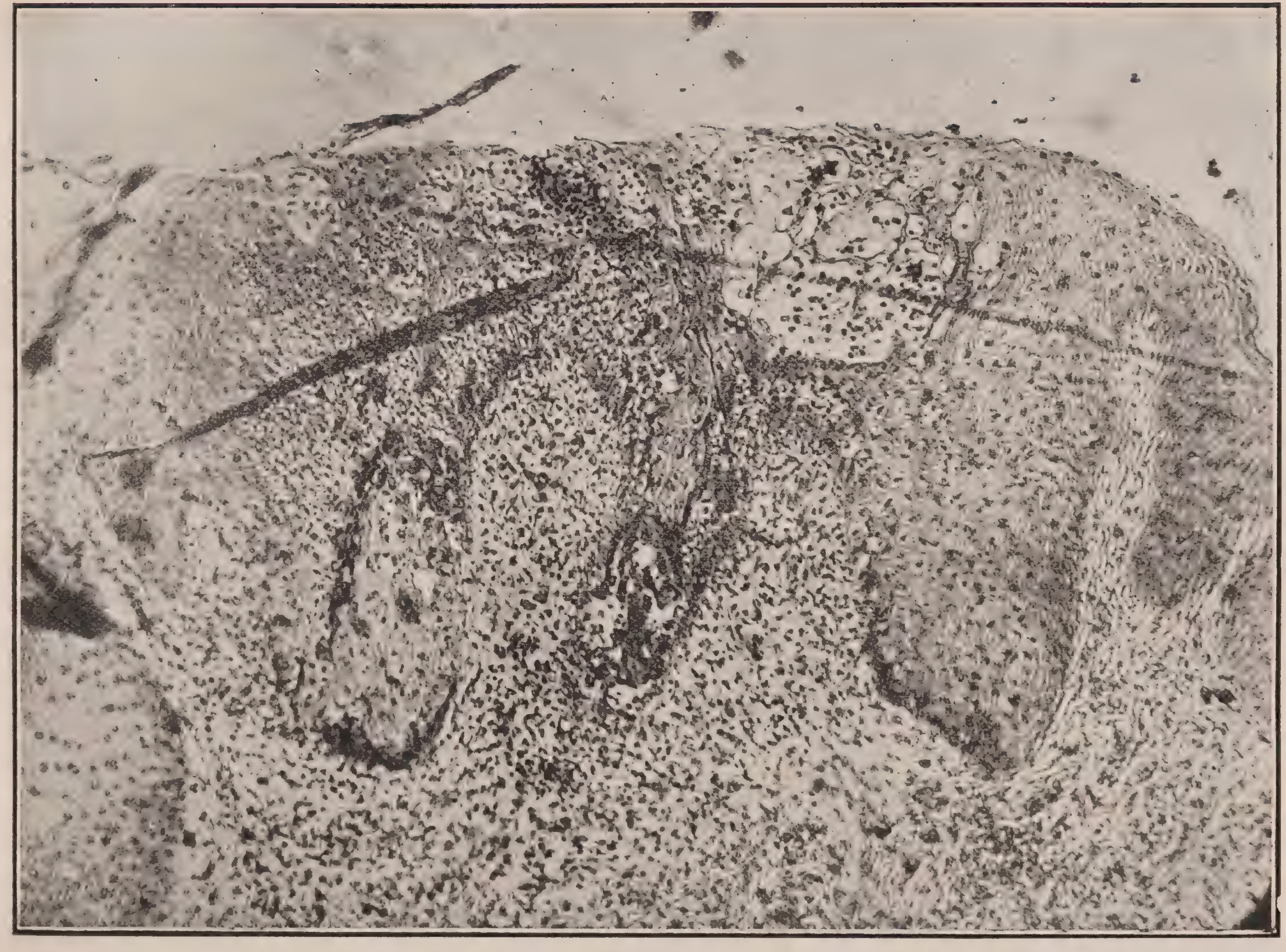


Placenta from Smallpox Patient, showing Leucocytic Infiltration and Necrosis.



Placenta from Smallpox Patient, showing Degenerated Villi



Smallpox, Sydney, 1913.—Early Pustule in Skin.

not seem to have extended deeper, although there was some polymorphonuclear infiltration of the cutis vera immediately below the vesicle. The polymorphonuclear leucocytes showed in great part nuclear degeneration and fragmentation. In many the nucle or fragments assumed the appearance of rounded scattered bodies dark on one side, with a lighter ring on the other, and of varying size. Further sections were stained by Giemsa's method, and were also put through Levaditi's process, but no definite parasitic bodies were detected. A special search was made for Spirochaetes.

The kidney, liver, spleen, and placenta were also examined by these latter methods, but with negative results. In the kidney the cells of some of the convoluted tubules were granular, with indistinct outlines, and somewhat swollen. Apart from this nothing abnormal was detected, as was the case also in the liver and spleen.

The placenta showed some interesting changes. There was nothing very remarkable to the naked eye about it in its preserved state as received by us. Some dark patches under the surface appeared to be dilated veins or blood-spaces. Sections showed a polymorphonuclear infiltration in parts, and also areas in which the chorionic villi had definitely undergone cell-necrosis. There were also areas of blood-extravasation, and also numerous places in and around the villi which showed nuclear fragments without definite cell-outlines. The appearances presented suggested that, through the cutting-off of nutrition to the villi, some of these had undergone degeneration and consequent invasion by polymorphonuclear leucocytes. This diseased condition of the placenta seems to afford a reasonable explanation for the frequency of abortions in the present epidemic. As the epithelium of the chorionic villi has the same epiblastic origin as the surface epithelium of the body, special search was made to see whether any changes could be detected suggestive of a condition equivalent to the pustules found in the skin. Perhaps the polymorphonuclear invasion may be associated with such a change.

The histological description of the skin-lesions found in this case are strictly comparable to those described for true smallpox.

Animal Experiments.—With some doubtful exceptions, attempts to convey chickenpox to animals have signally failed. On the other hand, the inoculation of material from smallpox patients has proved successful, and strains of vaccinia have been derived from such a source. It was therefore obvious that light might be thrown upon the nature of the present epidemic by an attempt to convey material from the pustules to cows. Such conveyance, if successful, would undoubtedly exclude the possibility of the disease being a form of virulent chickenpox.

During the course of the epidemic material was obtained from four patients about the fourth or fifth day after the first appearance of the rash, the material from each patient being kept separate. The lesions were in the condition of pustulation. The material thus obtained was conveyed to an isolated shed far removed from human habitations or the vaccine establishment. The first procedure was the inoculation of a bull calf on the 10th October. The material obtained, after dilution with approximately an equal amount of 50-per-cent. pure glycerine and water, was applied to small scarified areas on the abdomen of the calf. At the end of four days the areas were covered by fine yellow flakey crusts. There was no definite oedema or swelling, but some slight red ness was present round one area. As a control to these four areas a further area had been scarified, and glycerine and water alone rubbed in. All four inoculated areas did not show the same degree of reaction, one being decidedly less. It was doubtful from this experiment whether any definite "take" had been obtained, though this seemed probable. Two days later a second calf, a heifer, was similarly inoculated with material scraped from the previous case, and emulsified in glycerine and water. Four days later the inoculated areas showed dried scaly crusts more decided than in the first calf. These were slightly adherent, but there was no redness or oedema about them, and no definite swelling. They were scraped, and the material preserved for further inoculations. Five days after scraping, a re-examination of the areas showed in their neighbourhood several small papules, one of which had become a pustule. It seemed from this experiment that a "take" had been secured, though the result was still slightly indefinite.

On the 7th November a further calf was inoculated on four areas with the four different strains. At the end of four days there was a very definite reaction. The lines of scarification were showing up well. There was a moderate amount of scabbing with, in some of the cases, decided redness and swelling, and the presence of vesicopustules. There was now no doubt at all that a successful "take" had been established.

A fourth calf was variolated with material of the third remove on the 11th December, and took as in typical vaccinia, and on the 15th January the fifth remove was obtained from calf 6, when a large area was inoculated for the purpose of obtaining seed. The "take" in this instance was indistinguishable from that of typical vaccinia. It would therefore seem that in the fourth remove and onwards the reactions obtained were indistinguishable from those of vaccinia.

In addition to this attempt to produce typical vaccinia in calves from material obtained from the smallpox patients, these same animals were made use of to test further the relative protection obtained from the varioloid vaccine against vaccinia, and *vice versa*. Much interesting information has been obtained in this way, and it may be well first of all to summarize the results obtained from the various calves experimented with, and then to discuss the bearing of these results.

Summary of Inoculation made on Calves.

Calf 1—

Oct. 10. Variolated directly from four human cases on four small scattered white areas, each about ¼ sq. in. in superficies. Result: A slight somewhat doubtful take.

Oct. 21. Vaccinated over an area about 3 in. by 1 in. Result: Good typical take.

Nov. 7. Revariolated with material from first and second removes over two small areas, each about a square inch in area. Result: Definite slight take.

Nov. 24. Revariolated with the second and third mixed removes over two small areas, each about 1 sq. in. in surface. Result: No definite take.

Dec. 11. Revariolated with the third remove, over two similar small areas. Result: Definite slight take.

Dec. 30. Revaccinated over an area about 3 in. by 1½ in. Result: Definite slight take.

Calf 2—

Oct. 16. Variolated with the first remove over four small areas, each about 1 sq. in. in extent. Result: A definite slight take, more decided than in the case of calf 1, on the 10th October.

Nov. 7. Revariolated with the first and second removes over two small areas of about 1 sq. in. each in extent. Result: Moderately good take.

Nov. 24. Revariolated with the second and third mixed removes over two similar small areas. Result: No definite take.

Dec. 11. Revariolated with the third remove over one area of about 1 sq. in. in size. Result: Definite moderate take.

Dec. 30. Vaccinated over an area of about 3 in. by 1½ in. Result: Definite moderate take.

Calf 3—

Nov. 7. Variolated with the second remove over four small areas, each about the size of 2 sq. in. Result: A take almost as good as in typical vaccinia.

Nov. 24. Revariolated with the second and third mixed removes over two small areas, as in calves 1 and 2. Result: A slight but definite take.

Dec. 11. Revariolated with the third remove, as in calves 1 and 2. Result: Definite moderate take.

Dec. 30. Vaccinated as in calves 1 and 2. Result: A slight take.

Calf 4—

Dec. 11. Variolated with the second remove mixed lymph, the third remove mixed lymph and the four separate lymphs of the third remove, over six areas, each about 2 sq. in. in extent. The total area variolated was about 12 sq. in. Result: A take as in typical vaccinia.

Dec. 30. Vaccinated. Result: No definite take, crusts of the previous variolations still present.

Calf 5—

Nov. 24. Vaccinated for the purpose of preparing vaccine-lymph over an extensive area, probably amounting to 60 sq. in. A typical result.

Dec. 17. Revaccinated on the side. Result: No take, but it should be noted that this was an unfavourable site for revaccination.

Jan. 9. Variolated over an area of about 3 sq. in. with the fourth remove. Result: Fairly definite slight take.

Calf 6—

Jan. 15. Variolated with the fourth remove mixed over a large area of the abdomen, amounting to about 50 sq. in. Result: A good take, as in typical vaccinia.

Monkey—

Nov. 15. Variolated on the arm, as is done in vaccinating children, with lymph of the third remove, consisting of strains from two patients and the mixed strain from the four. This monkey took as in an ordinary vaccinia; there were some secondary papules about the primary lesions; no generalization occurred.

Jan. 22. This monkey and another fresh monkey were each vaccinated on the arm with ordinary vaccine-lymph in three places. On the ninth day the new monkey showed on each of the areas adherent yellowish-brown heaped-up scabs in a slightly indurated base with a slight surrounding red flush. Two of the areas on the original monkey's arm showed normal skin with the remains of the scratches, but the third spot showed a heaped-up yellowish-brown mulberry-looking scab, the size of a threepenny-bit. This occurrence, after variolation of a mulberry reaction in one area and no reaction in the other two, is of very great interest.

From a study of these animal experiments the following points may perhaps be deduced :—

(1.) On direct conveyance of a small amount of material from a recent human pustule to a calf the take is at first very slight ; is more definite, but still slight, in the second remove ; and assumes the appearance of typical vaccinia in the fourth remove. How far these progressive changes are due to the small amount of material avaliable for the first and second inoculations, and how far to an increased accommodation of the organism to the new host, is impossible to say. Calves 3 and 4 seem to indicate that there was such a progressive accommodation.

(2.) A very slight imperfectly variolated area will not apparently modify a subsequent vaccination.

(3.) Such a subsequent vaccination, if only over a small area, will modify but will not entirely prevent successful results on revariolation and revaccination (calf 1).

(4.) An extensive area of recent variolation may completely protect against subsequent vaccination (calf 4).

(5.) An extensive area of vaccination will profoundly modify attempts at variolation six weeks later, but may not absolutely prevent all reaction.

(6.) Variolated lymph of the third remove can produce an appearance in monkeys resembling typical vaccinia unaccompanied by any generalized eruption.

(7.) It is very obvious that the area variolated or vaccinated is a very important factor as regards complete protection against subsequent variolation or vaccination, or *vice versa.* The time-factor and the degree of reaction also probably play a part.

(8.) The results obtained from calves, whether variolated or vaccinated, seem to be identical.

Conclusions.

From the above-given microbiological data we have attempted to show that the present disease is a form of true variola. We have come to this opinion on the following grounds :—

(1.) Such a modified variola was what on microbiological grounds might have been expected to arise.

(2.) The disease in some of its features seems to be intermediate between ordinary variola and vaccinia, though so close to the former as to be in most respects indistinguishable.

(3.) Bodies resembling the *Cytorhyctes variolae* have been seen in material from cases.

(4.) The appearances of sections of tissues from cases accord with those described from smallpox patients.

(5.) The disease is conveyable to calves by inoculation.

(6.) The condition thus produced behaves as does inoculated vaccinia.

(7.) This inoculated disease and vaccinia are mutually more or less completely protective against each other, provided that sufficient area be inoculated.

THE RECENT EPIDEMIC OF SMALLPOX IN NEW SOUTH WALES: ITS DIAGNOSIS AND PREVENTION.

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The epidemic which is the subject of this paper has been of an exceedingly mild type. The fact that among over a thousand cases only one death occurred (that of a parturient woman suffering from smallpox, who died of collapse two hours and a half after childbirth) constitutes it, indeed, almost a unique record in the way of smallpox epidemics. In certain other directions the symptoms observed varied so widely from the classical picture presented by smallpox that at the beginning it was considered the disease was varicella. Unfortunately, the earliest cases were exceptionally mild, even when compared with the average of the whole epidemic, and the persons first affected were so slightly ill, and the eruptions experienced by them so scanty, that no medical man was consulted by them; and subsequent inquiries have led to the conclusion that smallpox must have been present in Sydney for at least six weeks, and affected an unknown number of persons, before the Department of Public Health had any knowledge of the presence of an unusual form of eruptive disease in the State.

For permission to use the official data I am indebted to the Director-General of Public Health for New South Wales (Dr. R. T. Paton), under whose direction the epidemic was controlled. I am also indebted to Dr. C. W. Reid, Chief Federal Quarantine Officer for New South Wales, for permission to examine and use the record of the Quarantine Hospital.

On the 30th May, 1913, the owner and manager of a factory for the manufacture of underclothing, situated in Chalmers Street, Sydney, and employing over two hundred hands, chiefly girls, reported that a number of his employees had during the months of April and May suffered from unusual rashes which appeared to be infectious. A Medical Officer of the Department of Public Health visited the factory the same day, and learned that between the 20th April and the end of May a number of young women employed in the factory had suffered with slight eruptions, for the most part on the face, but also extending to other parts of the body. In each case the appearance of the eruption had been preceded by an attack of so-called "influenza," in which the most prominent symptoms had been headache, vertigo, shivering, and general pains. In some of the cases there had been backache, and in a few there had also been some vomiting, usually slight. None of the girls affected had ever been vaccinated. The precedent illness in all the cases appeared to have been of a very mild type, and while some of the girls had stayed away from business for a few days, some had not considered it necessary to do so. Not more than two of the girls affected had consulted a medical practitioner, and in those cases they stated they had been told that there was nothing much the matter.

Further inquiries elicited that the first case in the factory had occurred on or about the 25th April, at which date a girl, E. D., aged twenty-two, had been attacked by "influenza." Three days later she had developed a "pimply" rash on the face. She had been absent from work for a week, and had returned to duty feeling well before the eruption appeared.

At first E. D. denied all knowledge of any possible source of infection for her illness, but later she stated to the manager of the factory, and subsequently to the writer of this paper, that she was very friendly with a young man, B. E., who had been a steward on the steamship "Zealandia," and who had arrived in Sydney on the 12th April from Vancouver, British Columbia. She saw him at his mother's house on the day of his arrival and the following days, and he was then suffering from an eruption on his face.

The young man, B. E., was afterwards seen and cross-questioned. He was aged twenty-three, and was said to have been vaccinated in infancy, but showed no scars of the operation. He was (on the 26th June) slightly marked on the forehead with six shallow depressed cicatrices, and with several smaller ones on the cheeks. On questioning he gave the following information: He left Vancouver, British Columbia, in the "Zealandia" on the 19th March and arrived in Sydney on the 12th April. The ship touched at Victoria (B.C.), Honolulu, Suva, and Auckland (New Zealand); and B. E. went ashore at all ports. While ashore at Suva on the 4th April he fell sick with severe headache, pains in the stomach, and great weakness (no vomiting), and was confined to his bunk for two days and a half after leaving Suva, but did not see the ship's surgeon. His illness therefore appeared sixteen days after leaving Vancouver. The day after leaving Auckland—*i.e.*, on the 9th April—his face "broke out" in pimples. The eruption was scanty, and was confined to the face, forehead, and back of the neck, and before it appeared he felt quite well. He considered that the rash was a crop of small boils, and it did not entirely disappear from his face until some days after his arrival in Sydney. No one else on board, so far as he knew, suffered from a similar condition. He admitted that he knew the girl E. D. well, and saw her several times after his arrival in Sydney. The subsequent history of this man, B. E., is best given at this point, though somewhat out of logical sequence.

On the 3rd July he was vaccinated; seven days later there was no sign of a normal "take." The site of vaccination presented three small "mulberry" marks slightly raised above the skin, without any sign of vesiculation and without any surrounding areola. There was no swelling or gland-enlargement. However, on the 16th July, thirteen days after vaccination, on revaccination he showed three large pocks with slightly brawny induration of the arm. The pocks were not exactly similar in appearance to ordinary vaccination lesions, but resembled them to a certain extent, and contained a yellowish lymph. There had been considerable delay in their appearance compared with the usual results of vaccination. As far as could be ascertained, no other person than the girl, E. D., who came into contact with B. E., suffered from smallpox.

On examination of the employees of the Chalmers Street factory it was found that nearly all the persons said to have been affected showed small stains, dried scales, and in a few instances very shallow depressed cicatrices upon some portion of their bodies. In one or two instances these had been fairly numerous, but in several cases the total number observed upon any one person did not amount to twenty, while in some there were fewer still. One girl, for instance, had three such marks on her chest, and one on one arm. Another had twelve on the face, three on the right arm, and one on the left arm. In some instances girls who had suffered from precisely similar symptoms ("influenza") to the others had recovered completely, and the symptoms had not been followed by any eruption.

On being questioned, the girls described the rash as having appeared as "pimples" and having come out in crops, which continued to erupt from day to day over a period of from three or four days to a week. Most of the girls appeared to have been rather more affected on the face than elsewhere, but this was not always the case, and in some instances the face had escaped altogether.

Every girl affected by the eruption stated that after the attack of "influenza," and before the rash appeared, she felt quite well, and continued so, and had returned to work either immediately or as soon as she was "fit to be seen."

The factory itself was in a new building, excellently planned in regard to lighting, ventilation, and sanitation, and maintained in an exceedingly cleanly and orderly manner. Most of the employees were engaged in making undergarments with the aid of sewing-machines run by power.

On the same date one of the girls, G. H., employed at the Chalmers Street factory was admitted into the Coast Hospital, Little Bay, suffering from a copious rash on her face, body, and limbs. She had been seen by two medical practitioners, who diagnosed her illness as a severe form of chickenpox. On the 31st May she was seen by Medical Officers of the Health Department in consultation with the Medical Superintendent. Her temperature was then normal, and she did not appear to be ill. She also was unvaccinated. The eruption in her case was more plentiful than in any of the other cases which had been examined; but the absence of any serious symptoms of constitutional illness, when weighed with the symptoms observed in the other cases that had occurred at the factory, led to the formation of the opinion by the Medical Officers that they were dealing with a form of chickenpox.

The occurrence of a relatively severe case in a patient in Sydney Hospital first caused serious doubts as to the nature of what had previously been regarded as varicella. Even this case, though in some of its features it conformed to the classical type of smallpox, was of so mild a nature in its constitutional reactions (though the patient was an unvaccinated girl) as to make the diagnosis a matter of some doubt. This case was reported to the Department of Public Health on the 18th June, and on the 18th and 19th June six persons who had never been vaccinated, but who were known to have suffered from the disease hitherto regarded as varicella, were persuaded to allow themselves to be vaccinated under control conditions. By "control conditions" I mean that in each case other unvaccinated persons were vaccinated at the same time from the same tube of lymph. The results of this experiment were very definite. None of the six persons who had been attacked by the illness reacted to the vaccination, while all the controls developed perfect vaccination lesions within the usual time.

These results were considered very suspicious, and the investigation was continued, and by the 1st July the officers of the Department of Public Health were able to submit such a body of evidence that persons who had suffered from the suspected disorder did not react to vaccination as to warrant the formal proclamation of the presence of smallpox in New South Wales.

The subjects of inquiry indicated by the title of this discussion are the diagnosis and prevention of smallpox, and the indication offered by recent events in New Zealand and New South Wales more particularly limits the scope of the inquiry to the form of smallpox recently experienced in the localities named. As a preliminary, then, it may be permitted briefly to consider the question as to the nature of the epidemics with which New Zealand and New South Wales have been afflicted. Speaking for the profession in Sydney, there is an entire unanimity among medical men who had any experience of cases in regarding the epidemic there as one of true but mild smallpox, and the evidence afforded by one New Zealand case which invaded New South Wales is in favour of the two epidemics being essentially the same in type.

The evidence as to the identity of the New South Wales epidemic with true smallpox may be briefly summarized as follows: The symptomatology is essentially the same, only differing in intensity of the manifestations. The period of incubation was the same. Vaccination was found to protect against the Sydney disease, and an attack of the disorder was protective, on the other hand, against vaccination. The liability to abortion among pregnant women and the infection of the foetus, which are so characteristic of classical smallpox, were also observed in the epidemic in Sydney. The more severe cases were accompanied by the typical variolous odour, and followed by the depressed scarring or pitting of the skin which is the usual sequela of classical smallpox. So far as one can speak at this present time, the pitting promises to be permanent.

All these characteristics except the last-named were entirely absent in the numerous cases of chickenpox which were under observation in Sydney during the smallpox epidemic. Chickenpox was unusually prevalent and unusually severe in Sydney during the year 1913. Over three thousand cases of chickenpox were seen and diagnosed by the staff of the Health Department during the epidemic of smallpox, and with very few exceptions the experienced staff found no difficulty in differentiating between the two diseases. Many instances occurred of chickenpox among recently vaccinated persons, and, on the other hand, in many cases persons recovering or but lately recovered from chickenpox were successfully vaccinated during the months of the epidemic. These observations were in marked contrast to the facts in relation to the cases of smallpox.

The theory that the disease observed in Sydney was a hybrid is unscientific, and will not bear examination for a moment. The behaviour of the two diseases towards vaccination entirely negatives any such supposition.

Smallpox, like all other diseases, has varied in intensity in different outbreaks. Mild outbreaks have been observed from very early time. Sydenham states that "Smallpox has its peculiar kinds, which take one form during one series of years and another during another." Jenner himself records an outbreak in which the virulence was surprisingly low. He says, "It was of so mild a nature that a fatal instance was hardly ever heard of, and consequently so little dreaded by the lower orders that they scrupled not to hold the same intercourse with each other as if no infectious disease had been present among them" ; and Van Swieten, in 1759, describes an outbreak which was "so mild that secondary fever is not manifested and constantly is wanting, convalescence coming on on the eighth day of the eruption."

To come to more recent times, during 1896 a very mild type of smallpox began to prevail in the south of the United States, and gradually spread over the whole country and into Canada. In 1902 it invaded the Island of Trinidad, and 5,154 cases were reported, with but twenty-eight deaths. In 1911 Chapin records that 3,294 cases occurred in North Carolina without a single death. The same writer states that it is highly probable that the mild form of smallpox observed in England during 1901 and 1902 was introduced from America. Chapin further states that while this a typical form of smallpox was spreading in America the classical and more severe form appeared from time to time in various places. Both forms always appeared to "breed true," but he adds that "Health officers and clinicians all over the country who have had an extensive experience of the old type of the disease as well as with the other forms are convinced of their identity. The reasons are: the same period of incubation, the characteristic though mild prodromal symptoms, the development of the eruption at the normal time, the distribution of the eruption, and its perfectly characteristic appearance in most cases. The crucial test of the identity of the two forms is, however, to be found in their immunity relation. Persons who have had smallpox or who have been successfully vaccinated are at least as immune to the mild as to the severe type. It is also found that persons who have had the mild type are equally immune to vaccinia."

After having swept through the United States this mild type of smallpox invaded Canada, in parts of which it still persists. Official records show that it actually prevailed in British Columbia during the early months of 1913, and therefore at the time of the departure of the steamer "Zealandia" for Sydney with the steward B. E. on board.

The diagnosis of the mild type of smallpox, like that of the severer form, depends upon—(1) the distribution of the focal rash, (2) the characters of the focal lesion, and (3) the onset of the illness and its relation to the appearance of the rash.

The Distribution of the Rash.

The modern method of diagnosing smallpox gives precedence to the distribution of the rash, above all other evidence. In former times it was the accepted teaching to regard as more important the form or anatomical characters of the individual lesion. To quote Ricketts, "The evidence from position, there can be little doubt, is in most cases more intrinsically valuable than the evidence from character; it is certainly the more easily observed and the more generally dependable." The broad features of the distribution of the rash in the classical picture of smallpox are that the rash prefers the upper half of the body to the lower; that it is a rash of the face and arms rather than of the trunk and legs; that it affects the distal rather than the proximal ends of the limbs, the back of the trunk rather than the front, the extensor surfaces rather than the flexor. It prefers, in fact, those surfaces which are most liable to irritation.

These broad features applied generally in the Sydney epidemic, and were, on the whole, relied on by us as the most important evidence presented to us in diagnosing a case. In individual instances anomalies of distribution did occur, and were sometimes marked ; but these anomalies could generally be explained and allowed for if one did not forget the effects which precedent irritation of the skin always has upon the rash of smallpox. In three cases among pregnant women, for instance, which I saw myself the rash appeared first upon the abdomen, and continued unusually plentiful there throughout the period of efflorescence. This was due to the friction of the clothing upon the distended and prominent surface of a part of the body which usually escapes very lightly from the focal rash of smallpox.

In many of the cases of smallpox seen in the New South Wales epidemic the numerical severity of the rash was so low that all the pocks on the whole surface of the body numbered less than twenty, and even in some cases as few as three or four. In such cases it is impossible to expect the distribution of the rash to comply with any law. Nevertheless, when taken broadly the rash of mild smallpox as a whole does follow the laws of distribution observed by the classical type of the disease, and with surprising accuracy. In a doubtful case one has sometimes adopted the expedient suggested by Wanklyn of plotting out a plan of the rash upon one of those diagrams of the human figure which are sold by medical booksellers for recording physical signs, and this was always very helpful in obtaining a clear impression of the distribution of the rash, and a considerable aid in diagnosis. Usually in the milder cases of the epidemic the rash first appeared as a pimple on the nose or forehead, and in the majority of cases the rash on the face continued throughout efflorescence to exhibit greater numerical intensity than on any other part of the body. Nevertheless, instances were not wanting throughout the epidemic in which the face escaped altogether ; but these were rare. Next to the face, the eruption affected the extensor surfaces of the forearms, then the back (especially between the shoulders), next the buttocks and thighs. The chest, and still more the abdomen, was almost invariably relatively and often free from rash. This, of course, constituted a very useful diagnostic stigma in differentiating the disease from chickenpox. The scalp and the male and female genital organs (the penis and vulva) were very frequently invaded. In all the more severe cases the palms of the hands and soles of the feet were attacked, but in the milder cases they often escaped altogether. In the more severe forms of the disease the formation of the pocks beneath the thick skin of the soles was often attended by a great deal of pain, and these pocks usually became inspissated, and formed brown seed-like bodies which had to be dug out with a knife on convalescence.

Although the eruption was usually scanty and sparse in the type of smallpox seen in Sydney, it was not always so. Instances in which the rash was confluent on the face and arms occurred, and not rarely a semi-confluent rash in those situations was observed. In one patient in which the pocks were counted they numbered over four thousand upon the whole surface of the body, of which 362 were upon the face. In another instance there were over nine hundred counted upon the face alone. In the latter case nearly all the pocks were small and badly developed. These cases were exceptional, however, and the average number of lesions upon the face in the majority of instances ranged from about twelve to, say, thirty or more.

The Individual Lesion.

The focal lesion in the Sydney epidemic manifested great variations both in its anatomical characteristics and in its development. In a small minority of the severer cases it approximated in both directions very closely to that of the classical type of smallpox. In such cases the rash appeared in a single crop, the lesion passed through the regular stages of papule, vesicle, and pustule, and the whole evolution from the first appearance of the papule to the beginning of incrustation occupied about eight days. The vesicles in these rare cases were circular, flat-topped, or umbilicated, greyish in colour, and when pricked or incised the contents were not wholly discharged, indicating loculation of the vesicle.

In the overwhelming majority of our cases, however, the regular stages of development of the lesion were obliterated, or nearly so, and the whole period of evolution was much shortened. Often the first sign of the rash was an outcrop of pimples on the nose or forehead, which acquired pustular heads within a few hours, and sometimes the changes were so rapid that the lesions seemed almost to make their first appearance as pustules. They exhibited a strong tendency to appear in crops, which continued to erupt from day to day throughout the whole period of efflorescence until the earlier lesions had dried up or become scabbed over. As a consequence, lesions were generally present at the same time on the same part of the body in various stages of development—a state of matters which is not generally distinctive of smallpox.

Another direction in which the eruption in our epidemic was aberrant was in the large proportion of small and abortive lesions. In most cases of the classical variety of smallpox a minority of the lesions are small and abortive, but in the New South Wales epidemic such abortive lesions were often in the immense majority.

Most of the variations from the classical type observed in our epidemic appeared to depend very largely upon the superficial character of the lesions. This characteristic showed itself best in the absence of pitting of the skin after recovery, which was seen in most of the cases, and in the shallowness of the little ulcers, which were seen when a pustule was accidentally ruptured (about 10 per cent. of the patients, however, did not show pitting). When the lesions were fairly large their superficial character was also shown by the appearance of the margin of the pustule. In chickenpox the pustule or vesicle often appears to be lying upon the surface of the skin. In ordinary smallpox it juts through the skin, throwing the surrounding skin up in a slope round the base of the pustule. In this form of smallpox the appearance presented by a full-sized lesion is half-way between the two. It is less superficial than in chicken-pox and more so than in ordinary smallpox. The same fact accounts for the sinuous jagged outline and oval shape of the lesions which were often seen in the Sydney epidemic, especially in those lesions situated on the trunk.

It was the relative or complete absence of the eruptive fever which accounted for the exceeding mildness of the epidemic. Even in cases which passed as severe the maturation of the pustules was accompanied with very little elevation of temperature. In the case of the girl E. B., who was admitted into the Sydney Hospital, and whose illness in many respects was more typical of the ordinary form of smallpox than almost any other case seen in the epidemic, she never had a temperature to speak of after the rash appeared. She was admitted into the hospital on the 12th June, and the rash first appeared on the 15th. Previous to the appearance of the rash she had a toxaemic fever running very near to 105° F., but after the rash had once appeared her temperature only once touched 101° F., and that was on the 20th June, the day after her removal to the Coast Hospital. On the 21st it fell to 99° F., and on the 22nd to normal, from which it never rose again. All through the stage of pustulation she stated that she felt perfectly well, and complained of not getting enough meat to eat.

In most of the cases sent to quarantine the temperature continued normal throughout the eruptive stage, and the patients did not exhibit any symptoms of that profound illness which usually accompanies pustulation in the unvaccinated.

The Invasion Period.

The mode of onset of the illness—the third member of the diagnostic trinity enumerated—would be of greater value if human testimony were more reliable. Patients and their friends so often deliberately suppressed the truth, or for some reason made false statements, that this class of evidence always had to be received with great caution. When reliable, such evidence was of great value in diagnosis, and formed a diagnostic barrier between this degraded type of smallpox and the other disease which it most resembles—chickenpox.

It is usually rather gradual in its onset, and is marked by frontal headache (which, according to the statements of patients, is always the most prominent symptom), general febrile symptoms, backache (in about 20 per cent. of the cases), vague general pains, vertigo, rarely distinct rigors, and sometimes vomiting. Patients almost always liken the attack to one of influenza. The invasion period varies from one to ten days, and averages about five days, and during this time the toxaemic fever may run rather high. One had naturally very few opportunities of observing the disease at this stage, but in instances of the more severe cases which one has personally seen, and in others upon which the testimony of other medical practitioners has been forthcoming, the temperature in the invasion stage has mounted well above 103° F., and sometimes reached 105° F.

All the symptoms of the period of invasion usually remit for a variable time before the rash appears, and the patient considers himself quite well, and generally returns to work, if the illness has been sufficiently severe to compel him to cease work at all, for in some of the milder cases the severity of the symptoms is not sufficient to cause cessation of regular occupation. In some cases the symptoms of the invasion period do not abate until the rash appears, but this seems to be unusual. Speaking generally, the period of invasion is longer than in the classical type of the disease.

Judging from the cases in which young children have been affected in this epidemic, the invasion period is much less marked in them than in adults in all its manifestations.

Machinery for controlling the Epidemic.

The machinery for controlling the Sydney epidemic was twofold in character. The Commonwealth Quarantine Service established a sufficient medical and nursing staff at the Quarantine Station at the north head of Port Jackson under the control of Dr. C. W. Reid, Chief Quarantine Officer for New South Wales, to which all patients known to be suffering from smallpox were conveyed by steam-launch from the city. Here they were treated in the Quarantine Hospital, and detained until they were judged to be no longer infectious.

A special visiting medical staff was formed at the offices of the New South Wales Department of Public Health. Every case of suspected smallpox reported by a medical practitioner or by any member of the public was visited by a member of this staff, and if the case was diagnosed to be one of smallpox the patient was conveyed by motor-ambulance to the depot at Woolloomooloo Bay, where he was embarked on the launch. All medical practitioners were notified by circular of the obligations on them to report every case of illness which might reasonably be suspected of being smallpox, and the citizens generally were warned to the same effect through the public Press.

A very large number of persons were seen and examined by the visiting medical staff who proved not to have smallpox. More than three thousand cases of chickenpox alone (which has been unusually prevalent in Sydney during the year 1913) were thus seen. As soon as the staff had obtained some experience with the particular type of smallpox of this epidemic the diagnosis from chickenpox presented, as a rule, very few difficulties, and subsequent results showed that the number of mistakes made in diagnosis was small.

During the epidemic the method of treating contacts was twice modified. All through the epidemic the visiting medical staff on diagnosing a case of smallpox offered vaccination to all contacts. This practice was never changed. But at the beginning of the epidemic all house contacts were also conveyed to the Quarantine Station, and detained until vaccination was proved successful. Later on this policy was temporarily modified owing to the impossibility of housing all the contacts at the Quarantine Station during the height of the epidemic. During this period only those contacts who refused vaccination were deported to North Head. At a still later period, when the daily number of cases had fallen to two or three, the practice of removing all contacts to quarantine was again put into force.

The Influence of Vaccination.

The evidence gained from the epidemic of smallpox in New South Wales is a striking vindication of the value of vaccination. Our experience has been that whether one insertion or more were made—whether the area of the vaccination cicatrix were as large as a florin or as small as a pin's head—so long as a typical vaccine vesicle, followed by a foveated pigmented cicatrix, was produced the protection afforded against smallpox was absolute for the time being. The whole epidemic lasted for a period of time too short to afford any evidence as to the duration of the protection.

In reviewing the available evidence as to the efficiency of vaccination in protecting against attack it will be apprehended that that class of evidence has the greatest value which deals with the staff which had the control of the epidemic, because not only were the members of that staff more exposed to the risks of infection than the public generally, but they were constantly so exposed. Moreover, their vaccinial state could be easily and certainly ascertained.

The staff employed by the Commonwealth of Australia at the Quarantine Hospital, where nearly all the metropolitan patients were treated, numbered fifty-two, of which four were medical officers and forty-eight were nurses or hospital attendants. All the above were successfully vaccinated or revaccinated at the outbreak of the epidemic, and none of them contracted smallpox. The staff employed by the New South Wales Health Department, and coming into dangerous relationship with infectious cases, numbered fifty. Seventeen of these were medical officers employed in visiting and diagnosing suspected cases; five were sanitary inspectors; four were members of the disinfecting staff employed in disinfecting houses from which smallpox patients had been removed; twenty-four were nurses who were employed in nursing country cases and a few metropolitan patients who for various reasons could not be removed to the Quarantine Hospital. The whole of this staff were successfully vaccinated or revaccinated at the beginning of the epidemic, excepting one member of the disinfecting staff. This man managed to evade the general instruction which had been issued to the staff to undergo vaccination. He had never been vaccinated in his life, and *he alone of the whole of the two staffs contracted smallpox.*

Among those persons who suffered from smallpox the vaccination statistics were as follows: Sixty-seven persons stated that they had been vaccinated in infancy, but in only forty-six of these were any vaccination-scars visible. All of these sixty-seven persons were adults, and the majority were over forty years of age. Among them were two persons who claimed to have been revaccinated—one of them thirteen years and one twenty years before being attacked by smallpox. In addition to those persons said to have been vaccinated in infancy, two of those attacked in the Sydney epidemic claimed to have been vaccinated previously—one thirteen years and one fifteen years before they were attacked. One of the two in this last group showed a vaccination cicatrix, but in the other case there was no such mark to be found.

Passing to the subject of recent vaccination, it was found that with two doubtful exceptions no person who had been successfully vaccinated during the course of the epidemic afterwards contracted smallpox. By this one does not mean to say that no person who had undergone the operation of vaccination afterwards contracted smallpox. On the contrary, this happened in sixty-one instances. But with the two doubtful exceptions above referred to, in all the sixty-one instances the vaccinations had either been followed by no reaction whatever (thirty-nine cases), or had resulted in the aberrant reaction which Seheult has christened a " mulberry " (twenty cases), a reaction which, when it follows vaccination in a person who has not already had smallpox, appears to be due to defective lymph. A vaccination followed by this reaction does not afford protection either against subsequent vaccination or against smallpox. The two doubtful cases were those in which vaccination had been performed, thirty-eight days and two months respectively before attack, by medical practitioners who afterwards gave certificates of successful vaccination, but when seen by us the vaccination-scars were not foveated or depressed, and would not have been accepted by a member of the staff of the Department as indicating successful vaccination. The other 934 persons who were attacked during the epidemic had never been vaccinated.

These statements may be condensed as follows: Of the 1,070 persons attacked to the 31st December, 1913, in the New South Wales epidemic of smallpox, sixty-nine, or 6·4 per cent., had probably been vaccinated in infancy or over thirteen years before being attacked; 999, or 93·3 per cent., had never been successfully vaccinated before contracting the infection of smallpox.

The failures in vaccination indicated were due to the inferiority of the lymph used by the Department during one period of the epidemic.

Even these figures, powerful argument as they are in favour of vaccination, do not by any means disclose the whole of the case in its favour. Many instances occurred in the earlier part of the epidemic in which infantile vaccination was quite effective in protecting adults from infection. Cases, for instance, were not infrequent in which all the children of a family (born in New South Wales, and therefore unvaccinated) were attacked by smallpox, while the parents, who had been born in Europe and vaccinated in infancy, escaped infection. Sydney was probably prior to this epidemic, as regards the younger portion of its inhabitants, the worst vaccinated of any civilized community in the world. At the present time over 50 per cent. of its population is successfully vaccinated, and therefore effectively protected against smallpox for some years to come.

Another kind of evidence is that afforded by the results of vaccination of contacts. Over six thousand persons who were discovered to have come into close contact with persons diagnosed to have smallpox were vaccinated during the epidemic by the medical staff of the Department (quite apart from vaccinations performed in public vaccination-depots or by private practitioners), and in all cases in which vaccination was performed within two days of exposure to infection, and was successful in producing a normal vaccinal reaction, the vaccinated person was protected against smallpox. The only failures were the instances in which the exposure had been three or more days before vaccination took place, and the latter had therefore been unable to "catch up" with the infection. Our experience in this direction was in accord with the observation of Marson (Reynold's "System of Medicine"), that vaccination within two days after exposure to the infection of smallpox will usually avert the attack of the latter disease.

In quite a number of instances during the epidemic the person attacked by smallpox was the only unvaccinated member of his household. Such an event generally occurred in households residing near a dwelling in which a case or cases of smallpox had occurred between two and three weeks previously, and the other members of the household had been vaccinated in consequence as a precautionary measure.

To quote Wanklyn, our experience of the efficiency of vaccination during the Sydney epidemic was that *"Any one who is recently and successfully vaccinated cannot by any loss of health, by any degree of exposure, or by any possibility of any kind at all, contract smallpox."*

The "mulberry" reaction which has been referred to in this paper as occasionally following vaccination has been already described by Seheult in his account of the Trinidad epidemic of mild smallpox. This reaction may be produced under various circumstances. It was commonly and most frequently seen in Sydney after the vaccination of persons who had already suffered from the Sydney epidemic of smallpox. Vaccination of persons who were suffering or had suffered from smallpox in the vast majority of instances was followed by no reaction ; but in a minority of cases a slight and very much modified reaction resulted, which consisted in the delayed appearance at the site of inoculation of a red mulberry excrescence which either dried up without any further development, or which eventually resulted in ill-developed vesicles, often containing some blood. There was an absence in these cases of the inflammatory zone round the vesicles, and usually a lack of constitutional symptoms. When the vesicle dried up it formed a thin scale, which on falling off left a small red excrescence which gradually became absorbed. No cicatrix finally resulted, but the skin remained stained for some weeks.

A similar reaction to the above was often observed to follow the revaccination of persons who had been previously vaccinated (in infancy), but had not suffered from smallpox. It was also occasionally observed in persons who had never either been vaccinated or suffered from smallpox. In these cases it appeared to be due to some defective quality in the lymph, and, as has already been stated, a primary vaccination followed by such a reaction gave no protection against subsequent attack by smallpox. In Sydney most of the instances in which the " mulberry " reaction followed the vaccination of persons who had not had smallpox were consequent upon vaccination done with a particular strain of lymph, which was soon discarded on account of its proving inefficient.

It is to be noted here that the vaccination of persons actually suffering from the eruption of smallpox in the Sydney epidemic was occasionally, though very rarely, followed by a good reaction. Such successful vaccinations were done within one or two days after the smallpox-rash appeared, and the latest case noted was one in which successful vaccination was performed on the third day after the appearance of the smallpox-rash. This observation is in accord with the observations of Ricketts and of Hibbert and Robinson, all of which relate to the classical and more severe type of smallpox.

Infectivity of the Sydney Epidemic of Smallpox.

Infectivity in this epidemic appears frequently to have had a low intensity. For instance, in two cases, early in the epidemic before the diagnosis of smallpox was made, persons who suffered from very mild attacks (in one case there were only three or four lesions on the whole surface of the body) failed to carry infection into their families, though they occupied the same bedrooms as other unvaccinated members of the family. In cases accompanied by a copious rash the infectivity of the disease appears to have been fairly intense ; and in households unprotected by vaccination the disease has generally attacked all the members of the household as soon as a diagnosis of smallpox in one member of the family was made. This state of affairs was chiefly observed at the beginning of the epidemic, or in families where the earliest case was concealed or overlooked ; as later on, when one member of a household was found to be attacked, all the other inmates were protected by vaccination. The slow spread of the epidemic in an almost entirely unvaccinated population was no doubt due to the degraded infectivity. In most cases infection appears to have been conveyed by direct personal contact, and in quite a number of instances young men and women were found to have infected members of the opposite sex with whom they had been "keeping company"; on the other hand, the convection of infection by fomites was not much in evidence. Two striking examples to the contrary were that of a young woman who borrowed a handkerchief from an acquaintance suffering from a mild attack of smallpox, and was herself attacked twelve or thirteen days later; and the case of an old man who slept one night in a bed which had the previous night been occupied by a smallpox patient, with whom he had not been otherwise in contact: he also sickened with smallpox about a fortnight later. But in both these cases there were special opportunities for infection. As a rule, the progress of the epidemic could be traced by direct and close personal infection from person to person.

The evidence from the behaviour of the epidemic outside Sydney also points to low infectivity. In the course of the epidemic twenty-seven country towns or districts of New South Wales were invaded by smallpox, and the total number of cases diagnosed in these localities only amounted to fifty-two. The greatest number of persons attacked in any one locality was six, and in sixteen localities only one person was attacked. In all but six of the localities invaded, the first person, or the only person, attacked had come from Sydney, where he had been infected. In five instances the evidence of the source of infection was doubtful, and in one instance the person attacked had been infected in New Zealand. In country places, therefore, when the authorities were on their guard and ordinary measures of segregation and vaccination were enforced from the earliest diagnosis of an imported case of smallpox, the disease did not spread.

Conclusions.

(1.) The epidemic prevalent in Sydney during the latter half of the year 1913 was a mild type of smallpox, and was identical with the epidemic infectious disease variously known as "Cuban itch," "alastrim," "Spanish measles," "milk-pox," "lumbermen's itch," &c., which has prevailed during recent years in various parts of the Americas. The disease was probably introduced into Sydney from Canada.

(2.) Recent successful vaccination conferred absolute protection against infection during the Sydney epidemic.

(3.) Besides being mild in its manifestations, the disease had a relatively low infective power, and was, as a rule, transmitted only by personal contact. Transmission by fomites or by aerial convection rarely occurred.

(4.) As regards diagnosis, the only confusion liable to arise is between this disease and chickenpox. Such uncertainty is only likely to occur in respect of a few of the milder cases of this mild type of smallpox, and it may be overcome by paying attention to the distribution of the focal rash and to the manner of onset, both of which are distinctive from that of chickenpox. In a minor degree the characteristics of the individual lesion are also of value in diagnosis. For instance, the clear watery pock which collapses easily on pressure with the finger-nail, with escape of its watery contents, is very frequently present in some stage of an attack of chickenpox, and is never seen in mild smallpox. Some other characteristics of the focal lesion, such as shape, irregularity of outline, umbilication, and the occurrence of the rash in successive crops, have no great value in the diagnosis of chickenpox from mild smallpox. At the beginning of an epidemic of mild smallpox, diagnosis should be controlled by vaccination results.

(5.) The question of prevention centres round that of vaccination. In a well-vaccinated and revaccinated community the disease cannot spread. In an unvaccinated community it will certainly spread unless the earliest cases are sufficiently severe to attract attention, because many of the cases are so mild that patients will not regard their attacks seriously, and refuse to seek medical assistance. Smallpox in Sydney was almost entirely confined to the poorer neighbourhoods, because the better-educated classes nearly invariably sought vaccination or revaccination as soon as the existence of smallpox in an epidemic form was publicly notified.

THE SMALLPOX EPIDEMIC AMONGST THE MAORIS IN THE NORTHERN DISTRICT.

By P. H. Buck (Te Rangihiroa, M.P.), M.D., Ch.B.

The smallpox epidemic broke out at Te Horo, a Maori village in the hills some twenty-odd miles from Whangarei. The first Maori case was Erana Hare, a female, aged forty, who developed constitutional symptoms on the 1st May, 1913. From Te Horo the disease was spread to various adjoining villages by Maoris attending a Mormon gathering, and on into the Waikato in the south and the Mangonui County in the north. In the Whangarei, Wairoa North, Bay of Islands, Hokianga, and Mangonui Maori Council Districts there were considerably over a thousand cases of the disease. The villages that were most badly affected were Kairara, Te Horo, the villages in the Mangakahia Valley, and some adjoining Kaikohe, though the latter itself was comparatively free. An isolation camp was established at Kaikohe; and with it as headquarters a vigorous campaign was conducted by doctors, medical students, sanitary inspectors, and nurses (with the hearty co-operation of the Maori chiefs and the Maori people) against the spread of the disease. These rough notes are taken from the personal observation of seven hundred cases in various stages, and fairly accurate data as regards the effect of vaccination are drawn from the statistics taken from six groups of villages with a population of 882, in which 483 cases of smallpox occurred. In these villages a house-to-house census was made, with the assistance of the Maori Councils, and the figures carefully checked.

Infectivity.

The first point of interest in the epidemic was the low infectivity of the disease. It was spread by direct infection from close contact with patients. Very few Europeans contracted the disease, in spite of the fact that farmers and employers of Maori labour were constantly passing through badly infected villages, and even entering the huts of friends or workmen afflicted with the disease. They, however, exercised care in not touching patients, their clothing, or bed-clothes. There are also instances of Maoris unprotected by vaccination who, by isolating themselves in their own homes in infected villages, and avoiding visiting infected houses, and warning away doubtful visitors, escaped the disease. In Tautoro only one dwelling escaped infection. This was due to the chief who owned the house keeping his neighbours away from it. Yet, on hearing that his married daughter was ill at the Kairara Gumfields, he passed through four infected villages, saw his daughter in the pustular stage of smallpox, spent the night near the hut where nine out of the ten occupants were suffering from the disease, and returned to his family without carrying the disease. He himself was vaccinated, he stood clear of his daughter when speaking to her, and touched and ate nothing belonging to the infected house.

Susceptibility.

Sex.—Though the text-books state that sex exerts no influence on the disease, exact figures for six Maori villages show that the disease was more prevalent amongst the males in this epidemic. Thus, of the vaccinated population, the attack-rate was 3·92 per cent. higher amongst the males than the females, and the unvaccinated 1·8 per cent. This is shown by the following figures for the Villages of Mangakahia, Awarua, Tautoro, Rakautao, Mataraua, and Otaua :—

Sex.	Vaccinated.			Unvaccinated.		
	Total Number.	Smallpox Cases.	Percentage.	Total Number.	Smallpox Cases.	Percentage.
Males ..	178	16	8·98	302	248	82·1
Females	138	7	5·07	264	212	80·3

Age.—An outstanding feature of the epidemic was the lower attack-rate on children and the milder manifestations of the disease. There were innumerable instances of children with very few pustules living in the same houses as adults with a confluent form of the disease. In some children the eruption was so mild that many were vaccinated and re-vaccinated, but in no instance that came under our observation did the vaccination take. It is stated in text-books that in pre-vaccination days the chief sufferers were children. In the northern epidemic such was not our experience, as not only were the cases milder in children than in adults, but in proportion to the numbers in the various age-groups the attack-rate was lowest in children, and steadily rose through the ascending age-groups. The following figures from the six villages already alluded to show this :—

Age-group.	Number unvaccinated.	Smallpox Cases.	Percentage.
0–5	126	79	62·7
5–15	170	140	82·3
15–25	142	122	85·9
25–45	89	82	92·13
45 up.	40	37	92·5

Race.—Whilst the Maoris have been the principal sufferers, and have had the distinction of having the name "Maori epidemic" added to "Cuban itch" and various names used in other countries, the reason has not been entirely due to the racial factor in itself, but rather to other circumstances over which they had no control.

Firstly, the Mormon missionary who introduced the disease came to work amongst the Maoris, and developed the eruption at a large Maori gathering in a remote village at some distance from medical advice. Had he been a commercial traveller, whose operations were conducted amongst Europeans, the disease would have broken out amongst Europeans in the cities, and sooner or later some severe cases would have forced a diagnosis.

Secondly, the communistic system that prevails amongst the Maoris assisted the spread of the disease amongst the race. At Te Horo, where the Mormon gathering took place, people were crowded together in the same sleeping-rooms, so that the condition of close contact was present. On their dispersal to their various villages the same conditions were present.

Thirdly, in the case of the Maori sick, there is no such thing as isolation of the patient. Even where removed to a tent, relatives and friends crowd in beside the patient, and share and distribute any infection that may exist. Maoris will also travel long distances to see and nurse sick relatives. A woman went twenty miles to nurse her married daughter who was suffering from smallpox, then unrecognized. She returned to her own village, developed the disease, and died. The entire population was crowded together at the tangi* for a week, and out of a population of 183, 108 developed smallpox.

Lastly, the isolation of the Maori villages, the low death-rate, and the distance from and the expense of medical advice were factors in the spread of the disease.

That the racial factor would seem, however, to play some part seems to be evidenced by the fact that sixteen deaths occurred in the northern district, making over thirty deaths altogether amongst the Maoris, whereas in the Sydney epidemic there has only been one death, and in that there were other complications. Thus we must infer that in the two epidemics, which originated from the same source, the dark-skinned Maoris of New Zealand suffered more severely than the Europeans of Sydney.

Period of Invasion and Initial Fever.—The symptoms of the invasion period were constant throughout the epidemic, and were so well marked that in the infected areas the Maoris from practical clinical experience could diagnose the disease before the appearance of the eruption. The classical symptoms they gave were *tuhawiri* (chill, feeling cold, shivering fit), *mamae te matenga* (pain in the head), *mamae te tuara* (pains in the back), and *mamae nga ponapona* (pains in the joints).

Headache was the most constant, and was very severe, mostly in the frontal region and at the back of the eyes.

Shivering.—Patients complained that they could not keep warm, and many had rigors. This was a very constant symptom. Ker gives it in 84 per cent. of his cases in Edinburgh, and it was more than this, if anything, amongst the Maoris.

Backache was almost as constant a symptom as headache. Ker gives it in 54 per cent. of his cases, but I should judge that it existed in over 90 per cent. of the Maoris cases. It was very severe in the lumbar region, and, as many adults confessed, it was of so severe a nature in some that they cried with the pain.

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* Maori wake.

Pains in the joints were very common, the knee, ankle, elbow, and wrist joints being the ones most affected. In some cases the pains even spread to the finger-joints. A soreness of the muscles was present in some, and many stated that the disease commenced with influenza.

Vomiting was not common, though cases existed amongst children.

Pains in the abdomen were also frequently complained of, even amongst adults.

Initial Fever.—Nearly all the cases admitted to the Kaikohe Isolation Camp were in the eruptive stage, but cases seen in the villages during the invasion period showed suffused eyes and flushed skin, with free perspiration in some cases. Many complained of *kirika* (hot skin). A case seen by Nurse Heron, the Anglican Mission nurse at Kaikohe, on the first day of invasion ran a temperature of 102·6° on the second day, 103·6° on the third, and 103·4° on the fourth, dropping to normal on the fifth day with the appearance of the papules.

Constancy of the Prodromal Symptoms.—The above symptoms were very constant throughout the epidemic, no matter how mild or modified the attack, or how young or old the patient. In vaccinated adults, who escaped with very few pustules, and in twelve cases of variola sine eruptione, the prodromal symptoms seemed as severe as in well-marked pustular cases.

The Duration of the Invasion Stage.—This was rather longer than usual, many Maori patients saying that the rash commenced on the fourth day, others on the fifth day. As a rule, it lasted three to four days.

Prodromal rashes were fairly common. The Maoris stated that they thought many of the cases were measles until the eruption developed. A Maori reported that his children were down with measles, and on visiting the settlement the next day two children were found with a fading scarlatiniform rash on the face, and papules showing up. Most of the cases seen by me were on the face, and of the fine scarlatiniform variety. It came on usually in the last two days of the invasion period. As the constitutional symptoms subsided, larger macular areas showed up among the fine points of the prodromal rash, which faded away as the macules became papular. The rashes also occurred in many of the cases of varioloid in adults. As one case of variola sine eruptione puts it, besides the constitutional symptoms he had " a slight thickening of the skin," but no pustules.

Owing to our work being mainly directed to house-to-house vaccination through infected villages and establishing a cordon of successful vaccination round them, we did not handle patients much, for fear of carrying infection, and so cannot say anything as to the distribution of the rash over the body. I did not see any of the petechial rashes in the region of Poupart's ligament that Wanklyn looks upon as pathogomic when present.

The Eruption.—The relief experienced on the subsidence of the constitutional symptoms as the eruption appeared was so marked that many Maori patients declared that they thought they were cured. The pains disappeared as if by magic, with the exception of pain in the throat. This pain, due to the appearance of papules and vesicles in the throat, came on early in many cases, often in the fourth day of the invasion period. In the case of a female, aged thirty, seen at Awarua on the fourth day of the invasion period constitutional symptoms were still present, and papules were present in the mouth and pharynx when none had yet appeared on the face, body, or limbs.

The Papular Stage.—Typical cases showed macules and then papules. In some cases the papules presented the shotty feeling, whilst others did not. This stage usually lasted a day to a day and a half. In Nurse Heron's case the papular stage commenced on the night of the fourth day by appearing on the forehead, neck, hands, and back, and the temperature dropped from 103·4° to 98° on the fifth day.

The Distribution of the Eruption.—The eruption first appeared almost invariably on the forehead, but in a few cases the papules first appeared round the mouth. The forearms and the lower leg were also extensively covered, and even in mild cases these sites invariably showed some pocks. The front of the wrists and ankles showed the thickest crops, and the Maoris themselves stated the *pukupuku* (pocks) came out from the elbow and knee down, with very few on the upper arm and thigh. The palms and soles were also affected, and in these cases the pain was intense. The back and scalp were extensively covered in severe cases, and in some cases the abdomen seemed as extensively covered as the chest.

The eruption in many cases came out earlier in the buccal mucous membrane and the pharynx than on the skin. The hard and soft palate were also affected. The eruption in these sites ran a shorter course than on the external surface, as pustules were often in the typical stage on the skin when the pustules in the mouth and pharynx had ruptured and scarred. In addition to appearing earlier, they run a shorter course. Pustules were seen on the eyelids, conjunctiva, and even on the cornea.

The Stage of the Vesicle.—Vesiculation usually appeared on the sixth day from the commencement of the invasion stage. There was considerable pain in the throat, which showed vesicles. The duration of this stage was from two to three days.

Umbilication was present in a large number of cases, and absent in others, especially the mild cases, which had aborted or modified vesicles. The best examples of umbilication I saw were in the mouth.

In well-marked cases the vesicles were large and full-sized, but in many of the milder cases they were smaller in size. The bases showed an areola of redness round them. The point remarked by Ker—that the lower extremities may show a slightly later stage than the face and upper part of the body—was well shown in this epidemic. The vesicles on the face, besides appearing earlier, maturated more quickly. Thus typical clear vesicles were present on the forearms and lower leg when the face was well advanced in the pustular stage. The pain in the soles and palms was severe, even when the vesicles in these sites were few.

The temperature in this stage remained normal, with a slight evening rise of about 1°.

The stage of the pustule was considerably shortened, crusts commencing to form in three days, or even less. Oedema was well marked in the confluent cases. It commenced at the close of the vesicular stage. The face was swollen out of recognition, the eyes closed, and the lips thick and everted, with saliva dribbling from the mouth. In these severe cases the pustules over the nose became confluent, and in others many on the arms ran into one another, forming large flat pustular bullae. The inflammation round the bases of the pustules was marked. Maturation, as already stated, proceeded more rapidly on the face.

In *the stage of desiccation* the crusts separated very quickly, as the inflammation did not extend very deeply in most cases.

Secondary fever was present in severe cases. In Nurse Heron's case pustulation commenced on the ninth day, and the temperature rose in the afternoon to 101·2°, on the tenth day to 103·6°, the eleventh day it was 102·4, the twelfth day 100·2°, the thirteenth day 99·2°, and the fourteenth day below normal. Thus the secondary fever in this case lasted four days, desiccation commencing on the twelfth day. Dr. Jessie Scott found secondary fever present in the severe cases in the Kaikohe Isolation Camp.

In the milder cases there was no secondary fever.

In the above case desiccation commenced on the twelfth day; two days later the crusts were loosening on the face, and by the seventeenth day the crusts were off the face, with the exception of the end of the nose. Mild cases ran a quicker course even than this.

When desquamation took place brown stains were left. These have gradually disappeared, leaving in many cases slight pitting. In other cases, on the separation of the crusts, the stained skin was found to be slightly raised above the level of the surrounding skin; these have since subsided and left pitting. Other cases, again, showed marked pitting after the separation of the crusts.

Complications were few. Bronchitis was singularly absent, considering how prone Maoris are to it. The mildness of the winter no doubt helped. Eyes: Severe conjunctivitis occurred, and corneal ulcer in one case. Otitis media has been seen in two cases. Boils and superficial abscesses occurred in a fair number. Orchitis and inflammation of the labia majora was present in quite a number of instances.

Types of the Disease seen in the Northern Epidemic.

(1.) Discrete smallpox.

(2.) Confluent smallpox: A fair proportion of the cases in adults were confluent on the face, especially over the nose, and in many the pustules on the forearm ran together. The worst case I saw was an adult male, aged fifty-two, at Mangakahia. He had been unsuccessfully vaccinated. The pustules were confluent on the face, parts of the arms and legs, and even on the chest. The oedema was very great, the odour strong, and the case ended fatally.

(3.) Coherent or semi-confluent cases were prevalent.

(4.) Varioloid or abortive: The number of mild cases, especially among children and young adults, was one of the characteristics of the epidemic. Among children they formed by far the larger number, and there can be no doubt that many would have been difficult of diagnosis had they not lived in the same rooms as typical confluent cases in adults, and shown the same constitutional symptoms and a typical distribution of the eruption. They occurred among both vaccinated and unvaccinated. They may be classified into the following groups, which all had well-marked constitutional symptoms lasting from three to four days, and many had prodromal rashes:—

(*a.*) *Without eruption,* or *variola sine eruptione.*—Out of thirty-two cases of the disease occurring in previously vaccinated persons, twelve were of this form. These cases all occurred in badly infected houses, and were carefully verified.

Case: In a family of two adults and seven children the mother developed the disease first and then the father. Both were confluent cases, and the father is the most marked case of pitting in the North. Of the seven children, four who were unvaccinated developed the disease, with the characteristic eruption. The three others had been successfully vaccinated in 1905. Of these, two had shivering fits, pains in the head and back, and a slight prodromal rash. The symptoms lasted three days, and vanished without the development of a single pustule or even a papule. These cases occurred in children who were fairly well protected, but more remarkable cases occurred among adults.

Case: In a family of seven, living together in one room, the mother had a severe attack, which has left her well marked. The husband had severe constitutional symptoms for three days, and recovered without developing a papule. The five children then developed the disease, with the characteristic eruption. Of this family of seven the father was the only one who had been successfully vaccinated. He was fifty-three years of age, and had been vaccinated in his youth.

Of the twelve cases, five were over the age of forty-five.

(*b*.) *Papules only*.—An adult male, the head of a family of ten, had severe constitutional symptoms, and developed papules on the face, which disappeared without vesiculating. He was forty-nine years of age, and had been vaccinated in his youth. Of the family, six others had the disease, with the eruption. I saw the papular case some time afterwards, and could not see the slightest trace of a mark of smallpox. He was vaccinated again, without success.

(*c*.) *Vesicular Stage only*.—In many the papules became slightly vesicular on the top, in others small modified vesicles, and in others again normal vesicles dried off without passing through a pustular stage at all.

(*d*.) *Modified Pustules*.—In these cases, which formed the greatest number, the modification took place in two ways: Firstly, the pustules themselves were smaller and rapidly desiccated; in many the tops of the vesicles maturated and dried off without forming typical pustules. Secondly, the number of pustules was small, even where they were typical in appearance; this was especially noticeable in persons who had been successfully vaccinated some time previously. Of the thirty-two cases previously mentioned, sixteen were of this type. I quote four cases as examples: Hata Kiwi, male, aged sixty-two, one pustule, full-sized, on side of nose; Pahe Inia, female, aged sixty-five, four pustules on scalp; M. Pakira, male, aged sixty-eight, two scalp, two chin, and two on right palm; Inia Whare, male, aged seventy, one on side of nostril. These cases all had severe constitutional symptoms, lasting three days. The pustules were typical in size and appearance, but rapidly desiccated, and the various stages were condensed into a week. These four persons had been successfully vaccinated when they were young.

The modified forms occurred also in the unvaccinated, especially in children and infants. The pustules left very little marking, and many were revaccinated time and again, but without success. The parents often scouted the idea of the condition being anything else than *tarakura*, or scabies. The sudden appearance, however, in an infected house, with a history of ailing, the first appearance on the face with a symmetrical distribution on the limbs, and the subsequent failure to take vaccination, proved the diagnosis. Most probably many of the children in infected houses, who were revaccinated three and four times without success, had had the disease in a very mild form.

The danger of these mild cases communicating the disease is shown by the following case: A female, aged eighteen, successfully vaccinated ten years ago, was the first case in a family of eight. She developed a few pustules round the mouth, which commenced scabbing in four days. She infected six other members of the family, three children mildly and three adults severely with the confluent form, one of whom died of the disease.

Haemorrhagic forms of the disease did not come under our observation in the North. Haemorrhages into the pustules, however, were fairly common. They occurred well on in the pustular stage, and took place on the palms and soles, the forearms, and lower leg. Each pustule became a black spot, and the arms and legs looked as if studded with black currants. These pustules did not burst like the others, but dried into solid masses, and persisted longer in the desquamation stage. I never saw any on the face, where the blood-stained crusts were due to scratching.

Smallpox and Pregnancy.

During the epidemic I came across three cases of abortion in pregnant women suffering from smallpox, but I have recently heard of others from the Maoris, as they had not considered an abortion as a death. Some women who suffered from smallpox have some months afterwards been delivered of a still-born child. This has alarmed the Maoris so much in some of the villages where the epidemic raged that any woman who was pregnant when attacked by the disease, no matter how mildly, is now anxiously watched as the term of confinement draws near, public opinion being that the child will be born dead.

Mortality.

In the North there are sixteen deaths on record. There may be others which were not reported, and abortions are not counted in this number. Of these sixteen, three were under the age of five, one between five and fifteen, two between fifteen and twenty-five, three between twenty-five and forty-five, and seven over forty-five. The winter during which the epidemic raged was the mildest winter that has been known in the district for many years, and the climate itself is a mild one. Had the winter been a severe one no doubt the mortality would have been much greater. At Maungatautari, near Cambridge, where the climate is much colder, six deaths occurred out of sixteen cases. For the whole of the Maoris attacked, the deaths were nearly forty.

Diagnosis.

Wanklyn states that umbilication, shotty feeling, and loculation are of no significance when absent, and the search for them in the present epidemic led to considerable delay in the recognition of the disease. The presence of a well-marked invasion stage with a typical distribution of the rash were the main points of assistance. Constitutional symptoms may occur in severe cases of chickenpox, but in the present epidemic they were constant in mild cases, and, as has been shown, they were marked in cases which did not develop any eruption. The appearance first on the face is another important point, and the appearance on the forearm and lower leg was constant even in very mild cases. The involvement of the palm and the sole is also of great assistance. Many who had not seen any cases talked of *hakihaki*. *Hakihaki* (which is merely scabies, often with a mixed infection from scratching with dirty nails) has no constitutional symptoms, does not appear first on the face, and is usually asymmetrical in its distribution, besides not running definite stages of vesiculation and pustulation. The influence also of vaccination is a great aid. In this country, however, great care will have to be exercised in judging what constitutes a successful vaccination.

Many Maoris were so anxious to get a successful result from an attenuated lymph that they scratched their arms, and so obtained some inflammation and suppuration, leading to a scar.

Vaccination.

The protection afforded by vaccination was early perceived by the Maoris in the infected villages, who saw that the persons in stricken families who escaped the disease were those who had been vaccinated. They sent wires to their representatives in Parliament and to the Health Department asking for Public Vaccinators to be sent among them. When the vaccine at first gave poor results many came five or six times, and begged to be vaccinated again; and some resorted to arm-to-arm vaccination from those who had successfully taken.

The instances in which vaccinated persons escaped are very marked, as they were sleeping in the same room as bad cases, or came into close personal touch with them. The Mormon elder who introduced the disease was unvaccinated. Immediately after the meeting at Te Horo he was stationed at Awarua with two other elders, of whom one was vaccinated, the other not. The vaccinated one escaped, whilst the other developed the disease. The Maori woman in whose house the first elder slept at Te Horo was vaccinated, but her children were not. All the children caught the disease, but the mother escaped. Two Maoris living in a small bag-tent on the gumfields slept side by side, one, who was unvaccinated, having a severe form of smallpox; the other, who was vaccinated, tended him throughout his illness without catching the disease.

In the following table some examples are given of the manner in which smallpox attacked the unvaccinated in individual houses in Mangakahia, where all were equally exposed to infection:—

Number of Persons in each House.			Number who caught Smallpox.	
Total Number.	Vaccinated.	Unvaccinated.	Unvaccinated.	Vaccinated.
3	2	1	1	..
6	3	3	3	..
6	5	1	1	..
3	1	2	2	..
6	4	2	2	..
6	5	1	1	..
8	4	4	4	..
12	8	4	4	..
4	3	1	1	..
5	4	1	1	..
18	1	17	17	..

The last house in the above table is interesting, in showing that out of a family of eighteen living in one house the only vaccinated person was the only one who escaped the disease. In the second last house in the table, four were successfully vaccinated during the campaign, but the baby was not done on account of its being ill at the time. The baby recovered from its illness, and, being the only one in the family unprotected, it was the only one that caught smallpox.

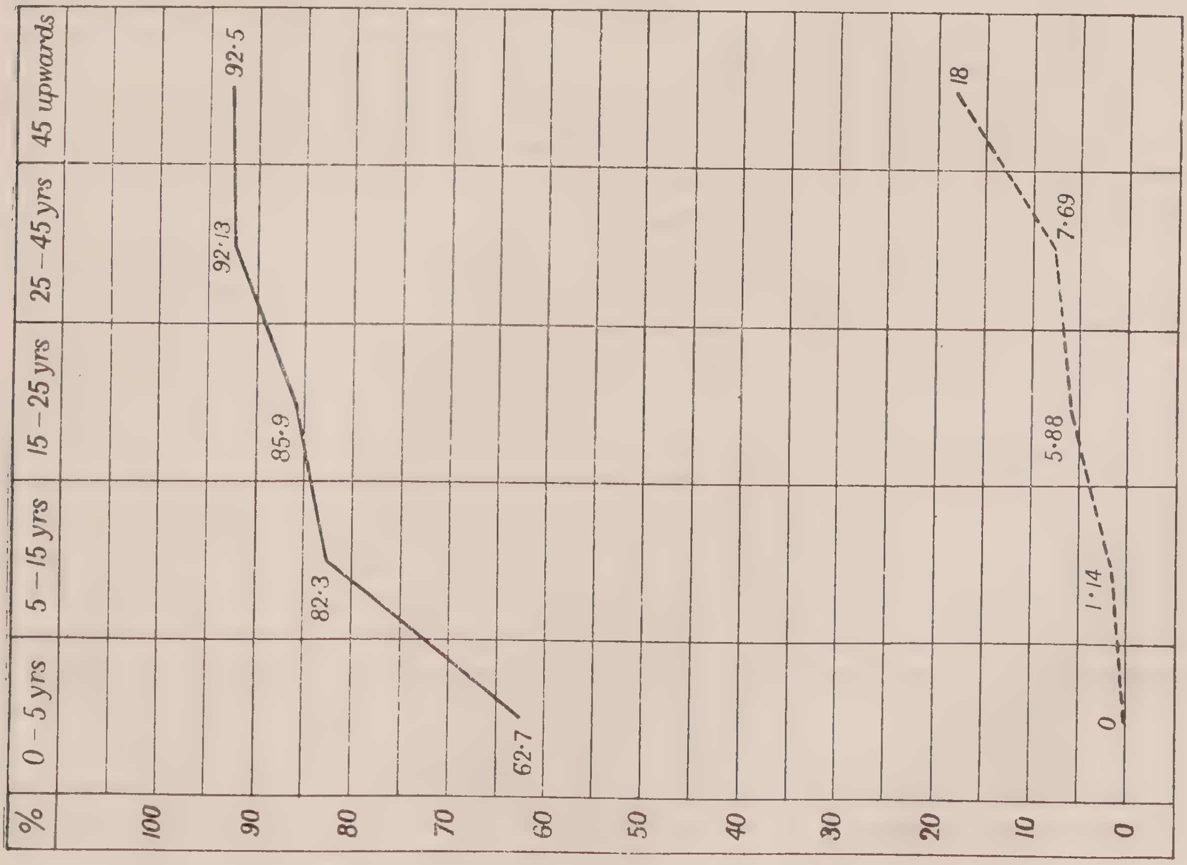
In the six groups of villages already mentioned, out of 483 cases of smallpox, 460, or 95 per cent., were unvaccinated. The rate of incidence as regards the population is as follows :—

Vaccinated.			Unvaccinated.		
Total Population.	Smallpox Cases.	Percentage.	Total Population.	Smallpox Cases.	Percentage.
315	23	7·3	567	460	81·1

The protection afforded by vaccination is shown still more markedly by a comparison of the attack-rate on the various age-groups as shown in the following table :—

Age-group.	Total Number in Age-group.	Vaccinated.			Unvaccinated.		
		Total Number.	Smallpox Cases.	Percentage.	Total Number.	Smallpox Cases.	Percentage.
0–5	159	33	None	Nil	126	79	62·7
5–15	258	88	1	1·14	170	140	82·3
15–25	193	51	3	5·88	142	122	85·9
25–45	154	65	5	7·69	89	82	92·13
45 upwards	118	78	14	18·00	40	37	92·5

The same results are shown in the following diagram, where the continuous line is the attack-rate among the unvaccinated and the broken line among the vaccinated :—



It will be seen from the above that no cases occurred among children under five years, and the attack-rate gradually rises as the age gets older, and the protection afforded by vaccination consequently becomes weakened. An extraordinary point was the length of time vaccination protected against or modified the attack. Numbers of persons of over forty-five years of age, and who had been vaccinated in their youth, many by the missionaries, were absolutely protected from smallpox, though in constant touch with it. In one settlement the Maoris isolated a family, and an old man who had been vaccinated over forty years was appointed as attendant. He lived with them throughout the course of the disease, tended and washed them, and never caught the disease. The power to modify the disease existed, of course, still longer. Of twelve cases of variola sine eruptione in vaccinated persons, five were over forty-five years of age, the oldest being sixty-five. Of sixteen cases of varioloid, seven were over forty-five years; and attention has been drawn to the very mild attack experienced by four of these, who range from sixty-two to seventy years of age, and who had been vaccinated between forty and fifty years ago.

In no cases did I see the disease among those who had been recently vaccinated. As pointed out by Hanna and others, vaccination will take at any time during the period of incubation, and even for the first day or two of the stage of invasion. I collected thirty-three cases where persons were vaccinated from twelve to one day before the invasion by smallpox, and the two ran concurrently. Some cases that were vaccinated during the first half of the incubation stage seemed to be modified, but others again that were done at the same period ran a severe course.

Treatment.

The treatment of smallpox is prevention. The most efficacious method of prevention is compulsory vaccination. It seems to say much or little for the toleration of civilization that it allows its trade and commerce to be dislocated, business to be practically brought to a standstill, and the food-supplies of the people cut off for the sake of a few fanatical anti-vaccinationists.

The importance of raising the vaccination index of the various villages and towns is admirably shown by what occurred in some of the Maori villages. Here it is seen that where the number protected by vaccination at the outbreak of the epidemic was low, or, if it may be so termed, where the vaccination index was low, the proportion or percentage of the population that developed smallpox was high. At Awarua, where only 10·87 per cent. of the population were protected by previous vaccination, 72·9 per cent. of the population developed smallpox. In the Mataraua, Tautoro, and Otaua group 17·1 per cent. were protected, and 54·9 per cent. caught smallpox. At Rakautao 33·3 per cent. were protected, and 46·1 per cent. of the population caught smallpox. In these villages the disease had long obtained a foothold before steps could be taken to raise the vaccination index. Contrast them with two other villages where protection was raised before the disease secured a good hold. Te Iringa, a village in communication with three of the above badly infected villages, had a vaccination index of 18·19 per cent., the same as Mangakahia, 18·2 per cent.; but before the disease had time to spread far this index of 18·19 per cent. was raised by vaccination and revaccination to 82 per cent., and the percentage of the population attacked remained at 16·4 per cent., as against Mangakahia's 53·2 per cent. Similarly, Taheke, with a vaccination index of 32·17 per cent. (with which compare Rakautao, 33·3 per cent.), was infected from Otaua, but by isolation and raising the vaccination index to 80·8 per cent. the percentage of the population attacked was 11·3 per cent., as against Rakautao's 46·1 per cent. This will be seen in the following table showing the effect of raising the percentage of persons successfully vaccinated :—

Village.	Vaccination Index.	Vaccination Index raised to.	Percentage of Population with Smallpox.
	Per Cent.		
Awarua	10·87	Too late	72·9
Mataraua, &c.	17·1	,,	54·9
Rakautao	33·3	,,	46·1
Te Iringa	18·19	82 per cent.	16·4
Taheke	32·17	80·8 ,,	11·3

In view of the fact that the public has a simple method of stamping out and preventing smallpox by means of compulsory vaccination, and thereby obviating harassing restrictions and quarantine with its accompanying inconvenience and dislocation of commerce, legislation along these lines would be well advised. The Maoris as a race are in favour of it, and would welcome it. It would seem another of the anomalies of civilization if they are to be subjected to annoying restrictions, and hampered in their means of obtaining a livelihood, because a small minority of the educated Europeans refuse to accept what science and experience has absolutely proved. Instead of the Maori being a menace to the community it is the unvaccinated European who has kept this disease alive, instead of having long ago relegated it to the list of extinct diseases.

DISCUSSION.

Dr. Frazer-Hurst (Whangarei) said the New Zealand outbreak had started in Whangarei, and there had been over four hundred cases in that county alone. He had had charge of the Isolation Hospital at Whangarei, and had visited the kaingas, having thus acquired an intimate knowledge of the disease by a daily intercourse extending over six months. As regards vaccination, he believed that recent successful vaccination—*i.e.*, having reached the stage of areola—was an absolute protection against smallpox, and he believed the evidence, so far as he had been able to collect it, was in favour of the protection afforded by vaccination against the late epidemic, but not to the same extent as in the case of smallpox. There had been cases occurring after recent successful vaccination, and the evidence was rendered somewhat indecisive by the marked low infectivity of the disease in question. When the disease first broke out the cases had been notified as smallpox, but Dr. Monk had twice deliberately stated that they were not smallpox, and the speaker had noted the characteristic features pointed out by Dr. Monk to be present in all the cases subsequently. He had seen smallpox patients, and though many of the worst cases were much more like smallpox, yet in a series where he had been able to trace the disease definitely from the original cases known through six generations the final series had produced a cervical herpes zoster rash in a vaccinated woman, and typical varicella in a child that mixed freely with four other children—two vaccinated and two unvaccinated —without infecting any of them. The pregnant women under his charge had not aborted, and the children had been born healthy—one had developed the disease two months later. Though this did not negative smallpox, yet the converse would not prove it to be smallpox, for in the *British Medical Journal* of the 17th May, 1913, p. 1054, was a record of intrauterine varicella. Again, the low mortality was remarkable. In over four hundred cases there had been three deaths, all having previous intercurrent maladies—very different from the mortality at Kirkcaldy and Newhaven last year. His observations gave the incubation period as 14–17 days. He had been able to trace the origin of the epidemic that started in Whangarei on the 13th April, 1913. This man was infected by a passenger on the " Zealandia," who came straight from West Jordan, in Utah, and was attacked during the first week out from Vancouver. Officially known as smallpox, the disease had been prevalent in America for some fifteen years past, and was there known by sundry names—"Manilla itch," "Canadian pox," "white pox," &c.—and had been the subject of a controversy as to its true nature, just as violent controversies had raged in Europe in the " forties " and " seventies " as to the identity of smallpox and chickenpox. Personally his observations suggested, as it was unlikely there was a third disease, and cases seen in series tended to approximate more towards varicella, that we had experienced an outbreak of virulent varicella that explained the confusion of past controversies, and though diffident in opposing the official diagnosis, yet they all knew many shared his views though they might not trouble to attend a discussion.

Dr. STAPLEY (Cambridge), Dr. J. H. LAWRY (Auckland), and Dr. ELEANOR BAKER (Auckland) spoke of their experiences of the epidemic in the north of New Zealand, endorsing Dr. Buck's conclusions.

Dr. W. B. MERCER (Whangaroa) showed on map how the epidemic spread from Whangarei County through the Maungakahia Valley to the Bay of Islands and Hokianga, where the largest number of Maoris were attacked. He then explained how Whangaroa County, in which the people were for the most part unvaccinated, was protected by vaccination from the epidemic, although the disease spread farther north and to the west. Dr. Mercer stated his emphatic opinion that vaccination was and always would be the main protection and means of prevention of smallpox.

Dr. GRAHAM BUTLER (Brisbane), Dr. SHARMAN, and Dr. VALINTINE (Inspector-General of Hospitals, New Zealand) also spoke.

Dr. BUCK replied.

RESOLUTIONS.

Dr. STAPLEY proposed, and Dr. J. A. NEWELL seconded, " That, in the opinion of this Congress, the epidemic which recently visited Australia and New Zealand was undoubtedly one of smallpox."—(Carried with one dissentient to twenty-nine in favour.)

Dr. STAPLEY proposed, and Dr. GRAHAM BUTLER seconded, " That, taking into consideration that this disease has been introduced, and that it will be very difficult to eradicate, this Congress strongly urges the various Governments of Australia and New Zealand to enforce universal vaccination and revaccination as the only practical method of stamping the disease out."—(Carried unanimously.)

ON THE USE OF CHLORETONE IN THE TREATMENT OF EPILEPSY IN CHILDREN.

By F. S. W. Zlotkowski, M.B., Ch.M.,

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In placing upon record six cases of grand mal treated by means of chloretone I shall confine myself to the results of the use of the drug itself, taking for granted that the usual dietetic and general care of the patient has been carried out. All the cases were well developed and of long standing, two at least showing evidences of cerebral defect resulting from the disease.

In all cases I found it a practical impossibility to treat the child satisfactorily in his own home. So long as he was treated either from the out-patient room or private house the full effect of the treatment was never observed, and was invariably disappointing. So soon, however, as the patient was transferred to hospital conditions the good results of treatment at once became manifest.

So striking has been the change for the better in every one of these cases that it seems to me well to insist, at any rate for some time at first, upon having the child under careful and constant observation away from his ordinary home conditions. This also especially applies to cases treated by chloretone, which requires careful graduation of dosage and constant watching.

I shall proceed to give in detail the first two of the cases, which are a fair presentment of the whole series.

Case 1.—W. D., aged thirteen years. The history of this child is an interesting one. He was born in Edinburgh, and lived in that city up to the age of twelve years. The mother states that he had a fit at the age of one year and eleven months. Up to three years of age he had on an average four fits per year. From three to five years of age he had none. He then went to school, and the fits returned at the rate of one each month during that year. He was treated at the Edinburgh Infirmary at the age of six years by means of bromides. These fits were so severe that (with the exception of the first) it was found necessary to administer chloroform on each occasion. He was now free for nine months, and then had three fits in quick succession. At the age of seven he had an occasional fit, which was sure to take place after any indiscretion of diet. At the age of eleven the fits became more frequent and more severe, and larger doses of bromide were administered. He then first began to become unconscious at intervals, and would walk about apparently quite oblivious of his surroundings. An idea of the severity of the fits at this stage may be gathered from the fact that sometimes he would be unable to recognize his parents thirty-six hours after the attack. He left Edinburgh at the age of thirteen, and had one bad fit on the passage out to this country. I saw him first as an out-patient at the Royal Alexandra Hospital for Children in 1910. He was a tall thin lad, with a rather vacant expression—general health good, but with such an ungovernable temper that his mother found him quite unmanageable. I started him with the usual bromide of potash. His record from this date is simply one of freedom from seizures for a month or six weeks, followed by a series of severe attacks sometimes numbering four in one day. The strontium salt had no better effect; this was tried for over nine months. I started the use of chloretone at the beginning of 1913. He had first 5 gr. three times daily, which was rapidly increased to 10 gr. t.d.s., and continued regularly. On the 15th August I note that he had had no fit since the 23rd May. For some days before the 24th October he refused to take his powders, and had a very slight "turn," and since that time has had no fit of any kind. So that this child, one of the worst possible forms of grand mal, has had no fit for the last nine months. Formerly most quarrelsome, bursting into an outrageous fury about nothing, he is now much calmer. He earns 17s. 6d. per week as a van-boy, and has developed a great ambition to "get on" in life. He sleeps well, and is now able to eat articles which previously would have certainly precipitated an attack—notably, hard-boiled eggs, and cheese. His memory, however, is not good. He is still under treatment, and, apart from the cessation of the fits, the most interesting feature of the case is that the condition of his mentality is steadily improving.

Case 2.—M. G., female. First seen in 1909. This was also a typical case of grand mal, exhibiting the frequent concomitants of the disease—unruly behaviour and furious temper. She was treated with the different bromide salts, with little effect, and was admitted to hospital in January, 1913. She had chloretone, 3 gr., once daily, which was increased to 5 gr. daily on 11th February, to 10 gr. on 14th February, to 15 gr. on 6th March, and 20 gr. on 18th March. As she then became a little drowsy, the amount was reduced to 10 gr. daily until her discharge at the end of April, 1913. On the 23rd February she had two fits, and from that time until her discharge on the 24th April she had none. The effect of home influence upon this case was, however, most marked, as she no sooner left the comparative discipline of the hospital for the greater freedom of the home than the fits returned, and it was not until I refused to treat the case further that the parents agreed to allow her to go away. She was placed with some strong-minded sensible people, and her improvement was at once marked, and she has had now no fits for five months. This was a very severe case, the fits being most frequent and violent, with the child rapidly becoming mentally enfeebled.

The rest of the cases present similar characteristics. Out of the six cases five have shown very marked improvement. Three have quite recovered, but sufficient time has not elapsed to speak with such certainty of the remainder.

My object in presenting these cases is to urge the more frequent and consistent use of chloretone in such cases. It has been advanced by some observers that comparatively small doses have brought on the well-known symptoms of chloretonism, and, in consequence, further efforts to exhibit the drug have ceased. These symptoms are (1) an increasing amount of stupor and dullness, followed by (2) a definite degree of vertigo, which if not relieved shades into (3) complete unconsciousness.

Should the first symptoms appear immediately after the drug is first administered it should be suspended entirely for a few days until they subside, then continued in smaller doses; and should it occur after administration and increase of the drug has been proceeding for some time, a substantial reduction in the dosage is, in my experience, all that is called for.

All my cases have stood the drug well, and the results have been so fortunate that I would strongly urge the much more constant and persevering use of chloretone in cases of grand mal than has hitherto been the custom.

SOME CLINICAL OBSERVATIONS UPON THE FREQUENCY AND APPARENT SIGNIFICANCE OF THE PRESENCE OF ABUNDANT OXALATE CRYSTALS IN THE URINE.

By C. B. Blackburn, M.D. (Sydney).

Mr. President, ladies, and gentlemen,—I think that I owe you an apology for bringing such a threadbare subject before your notice, but I will plead in excuse the fact that one is left with very uncertain ideas about oxaluria from reading the accounts of the subject in current works of medicine. My special attention was first directed to this matter as the result of an inquiry by a surgical colleague as to whether I met with many cases exhibiting urinary symptoms as the result of oxaluria. When I began to look into my histories I found so many points of interest that I decided to go through all my case histories of the past three years in which a complete examination of the urine had been made and try to discover if any conclusions could be arrived at in regard to those showing the presence of crystals of oxalate of lime in the urine.

In this investigation I have only utilized cases seen in private practice, partly because they were likely to be on the whole less seriously ill than patients in the public-hospital wards, and partly because I had taken the notes myself. The fact that notes had been taken usually before I knew whether there were any oxalates present may be regarded as a disadvantage, in so far that I did not make very minute inquiries as to the presence of symptoms that might be attributed to the presence of the crystals. However, this disadvantage is, to my mind, more than balanced by the advantage that the question of personal bias one way or the other in regard to any conclusions drawn is practically eliminated. I may state that in every case I ask if there are any symptoms of disorder of the urinary tract, and note the answer. I also in each case make a note of my diagnosis, and whether on subsequent visits my opinion is altered in any way. In collecting data for this paper I have made notes of the diagnosis, the presence or absence of urinary symptoms, and the state of the urine. In every case where a specimen of urine can be obtained on the first visit this is tested chemically and microscopically in my laboratory, and the result recorded. Such examination is repeated on subsequent occasions when abnormality was found on the first examination, but the presence of oxalates has not been treated as an abnormality, so that oxalate-containing urines were usually only re-examined when there was some other abnormality present. I need hardly remind you that in quite a considerable number of cases it is not possible to obtain a specimen on the first examination, and that in the practice of a physician very many patients are only seen once.

I find that during the three years 1911, 1912, and 1913 the total number of urines examined was 1,949. In addition to being chemically tested, all the specimens were centrifuged within half an hour of their being received, and a record kept of the microscopical appearance of the deposit. Calcium-oxalate crystals were deemed to be present in sufficient numbers to be recorded when there were a fair number of the typical envelope of dumbbell-shaped crystals in each field of the microscope. In many cases they were in countless numbers. I would like to here state again that when the notes were made no significance whatever was attached to the presence of the crystals.

When I began to collect the notes a few months back I noticed at once that oxalates were much more frequently found in urines brought in by patients in bottles than in those passed in my room. Of course, the observation was not an original one, though very little reference will be found to it in current medical works. To further elucidate this point, I took the next hundred successive urines passed in my rooms, and tested them at once, and again after keeping them for twenty-four hours. The result showed crystals in eleven on immediate examination, while after keeping for twenty-four hours the number had risen to twenty-nine. This is difficult to explain, but cannot have been due to diminishing acidity of the specimen ; for in these specimens, as also in the case of the whole number of cases to be afterwards discussed, oxalates were far more frequently present in acid urines than in alkaline, though they were sometimes found in intensely alkaline specimens, and were found in association with phosphates, urates, and uric-acid crystals in the various cases.

Before leaving these hundred specimens it is worthy of note that in five of the eleven cases showing crystals on immediate examination these were in only moderate numbers, but the numbers were not increased after the urine had stood twenty-four hours. These observations would emphasize the importance of examining a very recent specimen of urine before coming to the conclusion that any urinary symptoms complained of are due to irritation of the urinary tract by oxalates, and should also prevent us from concluding, from the presence of a few oxalate crystals in a fresh specimen, that there is necessarily an excessive excretion of oxalates taking place.

So much for my methods of obtaining my data.

I have thought it best to prepare two tables, showing in one the condition of the urines containing no oxalates and in the other the condition of those in which oxalates were found :—

I. Urines containing no oxalates—	No.
(*a.*) Those containing no albumin	389
(*b.*) ,, albumin, but no casts ..	506
(*c.*) ,, ,, and casts ..	431
(*d.*) ,, ,, and pus, but no casts	365
	1,691

II. Urines containing oxalates—	
(*a.*) Those containing no albumin	49
(*b.*) ,, albumin, but no casts ..	150
(*c.*) ,, ,, and casts ..	43
(*d.*) ,, ,, and pus, but no casts	16
	258

Like all statistics, these are in some respects fallacious, as a fair number of the specimens are re-examinations, but for the purposes of this part of the investigation it was hardly possible to do otherwise, because in some instances oxalates were present in some examinations and not in others. When I come to deal with the diseases from which the patients suffered it will be seen that the number of cases with oxalates is reduced to 190, the actual number of patients in whose urines the crystals were present. When we come to investigate these figures we find that about 15 per cent. of the urines contained oxalates. You will probably be surprised to note that albumin was recorded in so many cases, and I ought to explain that in many cases this would often only be a mere trace. Each urine is carefully filtered, and after the top portion in the test-tube has been boiled dilute acetic acid is added, and the test-tube held up against a dark background, and the faintest haze of opacity noted. In the records the amount is recorded as V.V.S., V.S., S., and so on—*i.e.*, very very slight, very slight, slight cloud of albumin. With this method minute quantities of albumin are found to be very frequently present, though, of course, I do not think any great significance should be attached to them. Personally, I make a point of allowing the patient to consider his urine as quite satisfactory when there is only a trace of albumin and no casts. It must also be remembered that most of the urines re-examined would contain albumin, and that these figures contain about 25 per cent. of re-examinations, and, further, in considering the percentages, that far more urines containing casts would be re-examined than any others. I must ask pardon for this digression, but I felt it was necessary to explain what might appear to some as rather incredible figures.

In comparing the two tables the most marked difference is in the case of the urines containing no albumin, and albumin without casts. In the urines free from oxalates 23 per cent. are free from albumin, while in those containing oxalates only 19 per cent. are free from albumin. On the other hand, in the first table 30 per cent. contain albumin without casts, and in the second table the percentage is nearly double—58 per cent. The figures are, of course, small, and one cannot conclude too much from such meagre statistics ; but they are, at any rate, suggestive of the fact that oxalates may at times irritate the kidneys during their excretion sufficiently to produce a slight leakage of albumin. It is satisfactory to note that apparently there is not much liability for such irritation to pass into actual nephritis, as an examination of the percentages of cases with casts as well as albumin shows a lower percentage in the oxalate series—13 per cent. against 25 per cent. Allowing even for the fact that the patient known to have chronic nephritis is normally on a spare diet, there still seems no reason to fear that in oxalatis we have a cause of chronic renal disease. My reason for giving a separate line to the urines containing pus in each series was, of course, in order that I might exclude them in writing out the percentages, as the pus would easily account for a slight amount of albumin.

The next question I have considered is how often the oxalates give rise to any symptoms of disorder of the urinary tract. As already stated, there were 190 patients with oxaluria, and of these, twenty-seven had made complaint of some urinary discomfort. In five other cases the microscope revealed a few blood-cells, though the patients had no discomfort whatever.

An analysis of the twenty-seven cases shows that five had an affection of the urinary tract with bacilli of the colon type, and were shown by the X-rays to have no calculi. One other was a hypochondriacal young man with a gleet and prostatic threads, and may, I think, be left out of consideration as well as the five. This leaves twenty-one who had symptoms apparently the direct result of the oxaluria, some had scalding, some pains at the end of the penis, some frequent micturition, three had recently passed blood in sufficient quantity to be visible to the naked eye, eight had or had passed calculi of various kinds.

It would thus seem that in about 10 per cent. of the cases with oxalates in the urine one may expect to find urinary discomfort, and that about a third of these will have calculi. Probably this is a low estimate, as I think patients with urinary symptoms consult a surgeon more often than a physician.

Leaving now the urinary aspect of the cases, I have prepared a table showing the diagnosis made of each of the 190 patients; and where, as was not infrequently the case, the disease was not limited to one system only, the diagnosis has been put down in the table according to the symptoms of which the patient mainly complained.

The table shows us that of these 190 patients the diseases present were,—

	M.	F.	Total.
Functional (hyperacid) dyspepsia ..	33	43	76
Chronic gastritis and atonic dyspepsia ..	6	11	17
Acute gastritis	3	1	4
Constipation from sigmoid new growth ..	..	1	1
Chronic nephritis	18	..	18
Arterio-sclerosis	5	3	8
Cases with various urinary symptoms (six of them had marked dyspepsia and one had a duodenal ulcer) ..	14	13	27
Miscellaneous	22	17	39
Totals	101	89	190

I thought it better to put the cases classed as miscellaneous in a separate table. They are,—

	No.
Influenza, with gastric intestinal symptoms ..	2
Acute colitis	1
Mucous colitis	2
Recurrent appendicitis	2
Pelvic disease, with dyspeptic symptoms	2
Asthma	3
Diabetes and glycosuria	3
Chronic arthritis (rheumatoid type)	4
Gout	1
Pernicious anaemia with marked anorexia	1
Functional nervous diseases	4
Spastic paraplegia	2
Valvular heart-disease (with early failure)	2
Pulmonary tuberculosis	1
Abscess in thigh	1
Adenoids and phimosis	1
Cases supposed to be well, and examined for eligibility for various positions	7
Total	39

An analysis of these tables shows that in about 60 per cent. of the cases the patients came under notice owing to frank symptoms of disorder of the gastro-intestinal tract, and that in the great majority of the other cases the patients had diseases associated with grave disturbances of the general metabolism. Apart from tea, there was no evidence that these patients had been indulging unusually in those foods

—such as rhubarb, spinach, and gelatine—which have long been known to lead to oxaluria. It seems reasonable to assume, therefore, that the oxalates excreted were not due to an abnormal intake, and that probably they were largely of endogenous origin, oxalic acid being an incompletely oxidized side product of uric acid, only needing more oxygen to complete its breaking-up into water and carbon dioxide. At the same time it is likely that exogenous oxalic acid would be likely to share the same fate as the endogenous and be excreted unchanged. It has long been known that the free exhibition of hydrochloric acid will often lead to increased excretion of oxalates in the urine, and this has been attributed to the acid preventing the absorption of oxalic acid from the food. Though this may be part of the explanation it can hardly be all, as I have notes of several cases with hyperacid dyspepsia, as shown by repeated test meals, where urines were quite free from oxalates. It seems more probable that the oxalates are due to certain defects in metabolism, and that the type of digestive disturbance associated with excessive secretion of hydrochloric acid often results in that defect.

It might be well here to call your attention to the fact that as early as 1842 Bird, and later Bigbie, described the oxalic-acid diathesis as a distinct entity, and attributed to the oxalic acid, supposed to be accumulated in the system, the indigestion, and especially the marked depression, of the patients. This theory has, of course, few adherents now, and I have notes of several cases with precisely this train of symptoms—hyperacid dyspepsia, but without oxalates. It is remarkable how rapidly the intolerable depression and weariness associated with this acid in the stomach will disappear after a fairly large dose of alkali.

It is remarkable, too, how often, when oxalates are present in these cases, they will disappear with the digestive symptoms. It has been impossible for me in the time at my disposal to trace the subsequent histories of many cases, but I took the first year—1911—and found that of the ninety-nine cases whose urines showed oxalates upon the first examination thirty-two were re-examined, and that in twenty-two no crystals were found. In all these cases it was noted that they were much better eleven were classed as acid dyspepsia, three as acute gastritis, and two as glycosmia, whose urine showed no sugar after dieting. The ten cases whose urines still showed oxalates were not much better, and had such chronic ailments as pelvic disease (two), neurasthenia (three), malignant disease of sigmoid, and so on. I think that in dealing with a case of indigestion without apparent organic basis the presence of oxalates in the urine might be taken as a ground for holding that the conditions were more likely to be one of hyper- than hypo-acidity.

I think it is possible, too, that a relative excess of amylaceous food may, by clogging the liver-cells with glycogen, play a part in the metabolic disturbance. Certainly the majority of people with digestive disturbance tend to exclude animal food from their diet, apparently on general principles. No doubt, too, overindulgence in the pleasures of the table will lead in some cases to overexcretion of oxalates; and the three patients with acute gastritis above mentioned pleaded guilty to this offence, and were promptly put on a much less liberal diet, with excellent effect both as regards their gastritis and their oxaluria. However, overeating is not usually a fault with the victims of functional dyspepsia. Perhaps I would be wiser here to explain what I mean when I use the term. I refer to a condition of disordered digestion in which I feel satisfied, by symptoms, X-ray examination, test meal, or other means, that there is no gross change in the muscular power or mucous membrane of the stomach, but I believe that its functions are disturbed by nervous influences, either of reflex or of central origin. I have shown that oxaluria is far more common in this type of patient than in any other. Apart from those cases where the metabolism is disturbed through some obviously acquired defect, it is not impossible that a few people may have a defective power of oxidizing oxalic acid congenitally, just as is the case with those with a uric-acid diathias, but from my own observations I think such cases must be very scarce.

I regret, Mr. President, that I have found it impossible to prevent this paper being of a rather diffuse character, but I will endeavour to crystallize the matter into a few brief conclusions, which, though tentative, may at least serve the purpose of a basis for discussion, and may also perhaps be the subject of further investigation.

Conclusions.

(1.) Oxalate-of-lime crystals are likely to be found in about 15 per cent. of medical cases if looked for in the ordinary way.

(2.) They are much less frequently present in specimens just passed than in those that have been kept some time.

(3.) In any case where urinary symptoms are thought to be due to the passage of oxalate-of-lime crystals a very fresh specimen should be examined.

(4.) A faint trace of albumin is more common in urines when oxalates are present than in others, but it may apparently be disregarded as an evidence of a disease or impending disease of the renal epithelium.

(5.) About 10 per cent. of patients with oxaluria have symptoms of urinary discomfort, and a large number of these have renal calculi.

(6.) About 60 per cent. of those found to have oxaluria will come under notice complaining of digestive disturbances, chiefly of the type often described as functional (hyperacid) dyspepsia.

(7.) Almost all the cases will show evidence of disordered metabolism.

(8.) In many cases if the disorder of the metabolism can be corrected the oxalates will disappear from the urine.

A CASE OF HAEMOCHROMATOSIS WITHOUT DIABETES.

By Sydney Jamieson, M.B., C.M. (Edin.), and Harold Ritchie, M.B., Ch.M. (Sydney).

The rarity of the condition and the intimate connection that exists between it and the very interesting problem of pathological pigmentation is our excuse for recording this case.

Clinical Details.—Martin Petersen, fifty-eight years of age, by occupation a steward, was admitted into the Sydney Hospital under the care of Dr. Sydney Jamieson on the 25th August, 1912, complaining of loss of power in the right arm and leg. His previous health had been uniformly good, except for some symptoms of "indigestion" ten years previously. The nature of his symptoms at this time led to an exploratory operation upon the gall-bladder, the expectation being that gall-stones were present. No calculi, however, were found. The patient denied having suffered from venereal infection of any kind.

Social History.—He had been a sailor and a steward for the greater portion of his adult life, and had done a considerable amount of laborious work. He was a heavy smoker and a moderate beer-drinker, but denied indulgence in spirits of any kind. The history of his illness was as follows: While engaged in his usual occupation, without any warning, he suddenly fell, and found himself unable to rise or to stand without support. He suffered no loss of consciousness and no pain, but he found that he had completely lost the use of his right arm and leg. There was at first no affection of speech. A similar attack had taken place four years previously. His family history disclosed nothing of importance.

On examination his temperature was 98°, his pulse 76, his respiration 16, and his speech was somewhat blurred.

The right arm and leg were slightly hemiplegic, the lower half of the face participating in the paralysis. Apart from the paralysis, the most striking feature of the case was a peculiar pigmentation present on the patient's limbs and face. The extensor surface of the arms were especially affected; they were stained in varying shades, from a silvery grey to a peculiar leaden colour; in places, almost dead black areas were to be seen.

The pigmentation of the face was not so marked as that found elsewhere. The buccal surface of the cheeks were dotted with areas of blue-black pigmentation.

The patient first noticed the discoloration some three months previously. On examination of the abdomen the liver-dullness was found to be increased, the edge of the organ being felt at a distance of about 1 in. below the costal margin. The organ was not tender, and the patient complained of no symptoms referable to his alimentary canal, the cardio-vascular and the haemopoietic systems exhibiting no marked changes.

A moderate degree of arterio-sclerosis was present, but the blood-pressure measured only 145 mm. The haemoglobin ascertained by Tallquist's method was 90 per cent.

Urine.—Specific gravity, 1,023. Acid: no albumen, sugar, pus, or blood. Repeated examinations during the course of the case failed to disclose the presence of sugar during any time.

The hemiplegia, which was slight in degree, began to improve after a few days.

A provisional diagnosis of haemochromatosis with hypertrophic cirrhosis of the liver was made, chiefly on account of the peculiar pigmentation being associated with an enlargement of the liver.

The patient stated that he had never at any time taken drugs, with the exception of an occasional aperient, so that it was possible to exclude such conditions as argyria and arsenical pigmentation. The symptom complex did not in any way suggest Addison's disease or pernicious anaemia, whilst the absence of any reaction suggestive of sugar or alcapton in the urine, and the freedom of the ear-cartilages from discoloration, contra-indicated a diagnosis of ochronosis.

Some three weeks after admission the patient developed signs of a basal pneumonia in the posterior portion of the lowest lobe of the right lung. Heart-failure rapidly ensued, and death took place on the 6th September, 1912. Unfortunately, I was absent from town at the time the patient died, and was unable to conduct the post-mortem examination myself, so I am indebted to Dr. A. M. Aspinall for the brief notes of the autopsy. Portions of the various organs were set aside for my inspection on my return, and from these I was enabled to make a histological report.

The following is a brief account of the appearance seen post mortem: The body was somewhat emaciated, there was a peculiar pigmentation of a greyish character present upon the extensor surface of the arms and to a less degree on the face. The right lung, which weighed 1 lb. 3½ oz., exhibited an area of pneumonic consolidation, most marked in the lowest lobe. The lung was firmly adherent to the chest-wall over a greater portion of its surface. Elsewhere a small amount of free fluid was found. The left lung weighed 1 lb. 2 oz., and, apart from a few adhesions to the parietal pleura, showed no abnormality. The heart weighed 11½ oz. The pericardial sac contained a similar amount of pale straw-coloured fluid. The musculature of the heart presented some changes, suggestive of fatty degeneration. The mitral valve was slightly incompetent, some atheromatous patches were present upon the aortic valve-flaps and in the first part of the aorta. The coronary arteries also showed signs of atheroma. There were no signs of free fluid or inflammation in the peritoneal sac. The liver weighed 4 lb. 8 oz.; the organ was enlarged, and its surface showed a morocco-leather-like appearance, evidently from cirrhotic change. On section the surface was gritty to the touch, and exhibited a peculiar yellow, almost orange-coloured, pigmentation. The gall-bladder was distended, but contained no calculi. The stomach and intestines appeared to be normal, the pancreas was markedly sclerosed and shrunken, and on section showed the same peculiar pigmentation as the liver. The spleen weighed 1 lb. 2 oz.; in consistence it was firm; it also showed a deep pigmentation of a brownish-yellow character. The genito-urinary system showed no marked abnormality, except for the presence of some traces of pigmentation in the kidneys and testes. The lymph-glands throughout the body showed a similar orange-yellow pigmentation. The adrenal bodies appeared to be normal, except for the presence of a small cyst in the left one.

Histological Report.

1. *Liver.*—The organ was intersected in all directions by broad bands of connective tissue in different stages of development, some being partly cellular and partly fibrous, others being fully formed connective tissue. The most striking feature of the section was the accumulation of iron-containing pigment (haemosiderin). This pigment was most abundant and most coarse in the strands of connective tissue that intersected the organ. It was present to a lesser degree also in the spaces between the tissue-cells. The liver-cells had undergone considerable change of a necrobiotic character, some being very shrunken and atrophied, others containing large droplets of fat, the latter cells being for the most part situated in close proximity to the tissue-bands. Some of the liver-cells contained granules of pigment which did not give the iron reaction.

2. *Pancreas.*—The whole architecture of the organ seemed to have undergone complete alteration, for it was intersected by large areas of fibrous and fatty tissue, which appeared to have displaced the normal gland-tissue to a great extent. The remainder of the organ was cut up by bands of newly formed connective tissue. These changes so altered the appearance of the section as to render it unrecognizable as pancreatic tissue. The cells of the acini were for the most part shrunken and atrophied, but in some places their structure was only altered by the deposition of fat-globules within them. The islands of Langerhans were so much altered that in places they were represented by mere whorls of dense fibrous connective tissue. In other parts these changes were less marked, and in small areas of the section a few of the islands were seen that had undergone but little change. This organ, like the liver, contained two classes of pigment—the one, iron-containing (haemosiderin), was found for the most part in the cells of the acini; the other, non-iron-containing (haemofuscin), was found to a large extent in the spaces between the connective tissue-fibres. The coarser granules of haemosiderin were most obvious in the parts in relation to the connective tissue-strands.

3. *Spleen.*—Here a considerable amount of connective tissue in all phases of development was found scattered through the organ, following for the most part the lines of its fibrous tissue skeleton. The pigment in these sections was to a large extent found in relation to the cells constituting pulp, some granules being found within the cells, others in the spaces between the cells; the former were for the most part of the nature of haemofuscin, the latter almost entirely haemosiderin.

4. *Lungs.*—The changes here were to some extent representative of a chronic interstitial inflammation, with scattered passages of bronchopneumonia. Little or no iron-containing pigment was found in the connective tissue-bands; particles of pigment of a foreign character were found, being most numerous in the spaces between the connective tissue-cells.

5. *Kidneys.*—The changes seen in this organ were those of cloudy swelling bordering on catarrh, but no pigment was detected.

6. *Adrenal Glands.*—Showed but little change; some pigment was present; the haemosiderin was largely represented in the spaces immediately beneath the capsule of the organ, but granules of haemofuscin were sparsely scattered through the substances of some of the cells, this latter condition being most marked in the cortical cells.

7. *Splenic Artery.*—Sections of this showed no pigmentation whatever.

8. *The Portal Vein.*—In the subserous lymph spaces of this vessel granules both of haemosiderin and haemofuscin were found, none being present in the muscular coat or in the endothelial and subendothelial layers.

Remarks.

Many years ago French physicians described a form of diabetes "diabète bronzé," associated with a peculiar discoloration of the skin. For a considerable time the condition was deemed to be due to the diabetes itself. In 1889, however, von Recklinghausen placed the interpretation now accepted upon the pathology of this condition. Since that time several observers—notably Futcher, Osler, Opie, Beattie, Miller, and Abbott—have published studies of the disease. Cirrhosis of the liver and sclerosis of the pancreas, associated with the abnormal deposition of pigment, precedes the diabetes. In other words, the diabetes is consequent upon the destructive changes in the pancreas. The skin-pigmentation does not always appear early in the disease. The liver and pancreas may be deeply pigmented and cirrhotic, and sugar may be present in the urine before the skin is affected. This fact deceived some of the earlier observers, who misconstrued the sequence of events. According to most writers the nature of the pigment in the liver, pancreas, spleen, and other organs differs from that in the skin, involuntary and cardiac muscles. The pigment is of two kinds—the one iron-containing (haemosiderin), the other iron-free (haemofuscin) ; but in the present case no sharp line of distinction can be drawn between the two pigments. They appear in their characteristics to merge into one another. In this respect our case closely resembled that described by Abbott. The condition is remarkable for its rarity, for up till July, 1911, Sprunt was only able to collect records of twelve cases in which death had occurred before diabetes ensued.

Von Recklinghausen considered that the pigment was entirely formed from the blood, and this view held ground for a considerable time. Opie, in his original paper, concurred in this view, but later writers have gradually tended to the view enunciated by Sprunt—that haemochromatosis is "a primary disorder of metabolism implicating many of the body-tissues, and manifested by a change in the chromogenic groups of the proteid molecule with the deposition of pigment."

In the case we quote there was no marked anaemia present, nor was there any history of its presence in the past. The pigmentation was only noticed three months before death. These facts are strongly antagonistic to any theory which postulates the entire production of the enormous amount of pigment present being derived from the blood itself. The only condition in which a comparable amount of iron is found in the tissues is pernicious anaemia, and surely if in haemochromatosis the pigment be derived from haemoglobin a condition of anaemia should eventually ensue, even if the process were comparatively gradual. As will be seen from the histological notes, the abdominal viscera exhibit a large amount of iron-containing pigment. Iron-free pigment (haemofuscin) is also present. Opie considers this latter pigment to be of the same nature as the pigment in brown atrophy of the cardiac muscle. But opinions differ on this point. Adami holds that "haemosiderin is an albuminate of iron loosely combined, while the probability is that haemofuscin represents an albuminate of iron in which, as in haemoglobin itself, the iron is in a more stable and firmly fixed combination." Our own findings would tend to confirm this view, as in some of the sections, after treatment with Perl's stain, the pigment is seen to range through a variety of hues, from the orange-yellow colour characteristic of haemofuscin to the greenish-black shade assumed by haemosiderin.

One of the most important observations in connection with this rare case is the fact that at no time while the case was under observation did the urine contain a trace of sugar, and that, too, despite the fact that the examination of the pancreas subsequently revealed a general sclerosis of that organ, resulting in a great destruction of the islands of Langerhans. It is generally believed to-day that these islands are to a large extent responsible for the production of the internal secretion of the pancreas, and one can readily believe that any condition such as a sclerosis which invades the organ may result either in the impairment or in the abolition of the function of these portions of that organ.

The question is reasonably asked, may the impairment or abolition of the internal secretion alone give rise to glycosuria, or is the disturbance merely a factor either causative or sequential which so acts upon other internal secretions as to interfere with their hormonic influence upon the normal process of metabolism? This case, if one may be justified in drawing so broad a deduction from a single clinical record, would appear to afford some proof for the assertion that we must look more deeply than the changes of islands of Langerhans for the explanation of the glycosuria in cases of diabetes in which sclerosis of the pancreas has been found to occur. At any rate, we know that glycosuria is by no means invariably associated with pancreatic changes, for numerous records are extant which go to show its association with such conditions as exophthalmic goitre, acromegaly, head injuries, and psychic states, and in such case it is probable that the internal secretions of the thyroid gland or pituitary body are factors of no small importance. The probability is that the condition is in all cases a most intricate one, and depends upon the interaction of various of the internal secretions.

In conclusion, I wish to acknowledge my indebtedness to Dr. Harold Ritchie, who, during my absence, took charge of the case on my behalf, and who was good enough to look up the references to the subject in the literature.

I also desire to thank Dr. A. M. Aspinall for the notes upon the morbid anatomy of our case.

THE TREATMENT OF YAWS BY INTRAVENOUS AND INTRAMUSCULAR INJECTIONS OF SALVARSAN AND NEOSALVARSAN.

By Philip Harper, M.R.C.S., L.R.C.P.,

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In August, 1911, treatment by salvarsan was started by me at the Colonial Hospital, Suva. Thirty-six cases of yaws were treated there before the end of that year. From January, 1912, treatment by salvarsan and neosalvarsan has been continued by me in two of the country districts, a further fifty-four cases having been treated. In one of these districts there was a hospital for the treatment of Fijians. In the other there was no such hospital, and patients were treated during my half-yearly tours of inspection in their own homes in the mountains.

In all, ninety cases of yaws have been treated, including a European, a Wallis-Islander, some half-castes, Samoans, Indians, and Fijians. The following table shows the number of patients of various races treated and the drug and method employed:—

Year.	Secondary Yaws.					Tertiary Yaws.							Drug used and Method.			
	Nationality.				Total of all Races.	Nationality.					Total.	Grand Total.	Salvarsan.		Neo-salvarsan.	
	Fijian.	Indian.	Wallis Isles.	Samoan.		European.	Fijian.	Indian.	Half-caste.	Samoan.			Intravenous.	Intramuscular.	Intravenous.	Intramuscular.
1911 ..	1	2	1	3	7	1	19	2	2	5	29	36	16	20	..	..
1912 ..	13	..	..	..	13	..	9	9	2	2	22	35	..	35	..	..
1913 ..	10	..	..	..	10	..	9	..	..	..	9	19	..	..	1	18
Total	24	2	1	3	30	1	37	11	4	7	60	90	16	55	1	18

As far as can be judged from the small number of cases treated, salvarsan has no selective influence on any particular race.

Several of the Fijians suffered from albuminuria for two or three days after treatment. I cannot say why this should be, and am of opinion that filariasis has nothing whatever to do with it.

The method of treatment was by intravenous injection in seventeen cases and by intramuscular or subcutaneous injection in seventy-three cases. In the cases treated during 1911 sterilized (but not filtered) distilled water was used for the preparation of a 1-in-50 faintly alkaline solution of salvarsan with 0·8 per cent. NaC1 for intravenous use. I now use sterilized filtered rain-water for this purpose.

Subcutaneous injection has been abandoned. For intramuscular use various oily suspensions were tried and abandoned, as was the faintly alkaline 1-in-10 solution of salvarsan in normal saline. I now use for intramuscular injection of salvarsan a 1-in-10 solution in sterilized filtered rain-water, this solution being strongly acid.

For intravenous injection of neosalvarsan a solution in sterilized filtered rain-water with 0·4 per cent. NaC1 is now used. For intramuscular injection of neosalvarsan a 1-in-10 solution in sterilized filtered rain-water is used.

One case was treated with "blister serum" obtained from two patients treated six and five days previously. No improvement resulted, and in any case such treatment has nothing to recommend it in Fiji.

To judge from the very small number of cases treated, salvarsan seems the preferable drug to use in hospital treatment, and neosalvarsan if patients have to be treated in their villages or at an out-patient dispensary.

With regard to dosage, it may be remarked that the average adult Fijian male weighs well over 160 lb.; the average adult Indian male in Fiji weighs probably somewhere about 110 lb. In dosage I am roughly guided by the body-weight.

Formerly 0·6 gram of salvarsan was given to an adult male Fijian intravenously in the treatment of yaws, but now I prefer a smaller dose, as I am of opinion that several small doses are as efficacious in the treatment of yaws as one large dose, and, while being safer, are not much more unpleasant. For yaws in Indians I give smaller doses than for syphilis.

Altogether my single dosage has varied from 0·1 gram of neosalvarsan intramuscularly to a baby of ten months of age to 0·6 gram of salvarsan (or 0·9 gram neosalvarsan) intravenously to an adult male Fijian.

The intravenous method is more preferable in hospital practice and the intramuscular when travelling.

There was one death among the early cases, quoted as follows in the annual report for 1911: "A female Fijian of about fifty years of age had been known at the hospital for some years as the subject of a chronic yaws ulcer of breast. She was a typical subject of chronic yaws cachexia with chronic nephritis (probably due to the arterial disease dependent upon chronic yaws cachexia). Considering the chronic yaws cachexia to be an indication for a full dose of salvarsan, on the 19th August, 1911, she was given 0·6 gram salvarsan intravenously. An hour later she had a violent rigor, temp. 103° F., very rapid weak pulse, and vomiting. Throughout the night she was given strychnine and digitalin four-hourly. On the 20th she was still very weak, her pulse was poor, and food made her sick. Her bowels were kept open by enemata. Her urine was solid with albumin. On the 21st she complained of pain in the abdomen and joints. The muscles of her legs were tender on pressure. On the 24th jaundice set in, her listlessness increased, and her pulse became weaker. She died an hour after a full meal had been given to her, against orders, by another patient. Her relations refused to allow a post-mortem. Death, in my opinion, was due to an overdose of salvarsan (arsenical poisoning). In the light of further experience I consider that 0·2 gram would have been a suitable dose to start with."

With the exception of this case, of the case treated by "blister serum," and of one case which was much improved though not completely cured, all the cases were apparently cured. Of the thirty secondary yaws cases all were acutely ill. Three children were so extensively ulcerated that it would have been impossible to place a halfpenny on an area of sound skin. It was impossible to determine how long these children had been affected before coming to hospital. One other case, an Indian child aged eight years, had been under treatment by another medical man for over nine months without improvement, in spite of the use internally of various drugs, together with local surgical measures. He was cured within a week by intravenous injection of 0·3 gram of salvarsan. He was examined two years and four months after treatment by salvarsan and found free of any signs of disease. During that time he had had no recurrence.

From what one sees of secondary yaws in Fiji it is certain that a majority of these cases must have died failing their treatment by salvarsan.

Of the tertiary yaws cases, the lesions were chiefly chronic ulcers, which had existed for periods of time varying from a month to over fifty years. The ulcers were usually multiple, and the situations included the nail-beds of the fingers and toes, plantar surface of foot (where the very painful granuloma ulcerates through the thick plantar skin, forming the "soki" or crab-yaw), the heel, the upper surface of foot, leg, thigh, penis, buttocks and anus, the hand, forearm, arm, shoulder, breasts, front of chest-wall, abdominal wall, back of the trunk, alae and septum of nose, cheeks, tongue, hard and soft palate, pillars of fauces, and larynx. Many of these patients suffered from periostitis with or without ulceration of the overlying tissues, the periostitis affecting the tibiae, manubrium sterni, ribs (with perichondritis of the costal cartilages), metacarpal bones, and phalanges.

Of the cases treated in 1911 for tertiary yaws four have been seen or definitely heard of after a lapse of a considerable period of time. The following short notes will describe their lesions, treatment, and results:—

Serial case No. 22: A European male, aged fifty-seven years, was born in Fiji, and has lived there all his life. He was sent to the Colonial Hospital in September, 1911, with a note from four European residents in his neighbourhood who evidently regarded his condition as hopeless. On examination he was very wasted and cachectic. His right hand was affected with chronic yaws ulceration, which had existed for over fifty years without ever having been healed, although he had at frequent intervals been for weeks or months under treatment by drugs such as potassium iodide internally, and by such local measures as scraping and dressings. For over two months he had had two unhealthy-looking protuberant ulcers of the skin of his face, and for one month he had had a deep rapidly excavating ulcer of the penis about 1¼ in. in diameter. He suffered from marked chronic nephritis, having to get up five or six times each night to pass urine. The sp. gr. of the urine was 1,006; it contained no albumen. On the 5th September, 1911, he was given 0·3 gram salvarsan intravenously. On the 11th September a further 0·3 gram subcutaneously was given. On the 20th September the ulcers were all healed. The man left hospital, as he expressed it, a healthier man than he had ever been before. He then had to get up only once or twice at night to pass water. I heard of this patient nearly eighteen months later, when he was reported to be "quite well."

Serial case No. 4 was an adult male Samoan. He was the subject of a tertiary yaws ulceration of both legs of at least nine months' duration. Round these ulcers there was a large area of scarring, which suggested that the legs must have been ulcerated on and off for many years. There was extensive periostitis of the right tibia. He had taken potassium iodide from a chemist for several months without improvement. On the 7th August, 1911, he was given 0·6 gram salvarsan intravenously. On the 21st August he was discharged with his ulcers healed. Over a year later he was well, and told me that he had had no recurrence of disease.

Serial case No. 12 was an adult male Fijian with tertiary yaws ulceration of hands, pharynx, and throat. Salvarsan, 0·6 gram, was given intramuscularly. Thirteen days later he was discharged cured. Two years and three months later he was examined and found perfectly well. He said he had had no illness since treatment.

Serial case No. 7 was an adult female half-caste who was admitted to hospital with many callous ulcers over her shins and forearms. Her left little finger was much scarred and ulcerated, and was contracted by scar-tissue. The patient gave a five-years history of this ulceration, but probably it had existed for much longer. She was given an intramuscular injection of 0·6 gram of salvarsan and a subcutaneous injection of 0·2 gram. The ulcer of her little finger took several weeks to heal, and by the time she was discharged she was very greatly improved in general health. A year later she was seen by another medical man and was quite well, having had no symptoms of yaws after treatment. The other cases treated during 1911 have not returned to the Colonial Hospital for treatment, nor have they come back to me, but occasionally I hear of people who say they were cured of yaws by me at the Colonial Hospital, so that the probability is that they have remained well since their treatment.

In conclusion, it may be said that salvarsan and neosalvarsan are the only drugs worth thinking of in the treatment of secondary yaws, which in Fiji is the most important stage of the disease. It is my opinion also that the injection of salvarsan or neosalvarsan is by far the most promising and radical method we now have for the treatment of tertiary yaws. So few cases of yaws have hitherto been treated by these drugs, and so short a time has elapsed since the earliest cases were treated, that it is inadvisable to jump to the conclusion that salvarsan is a cure for yaws. We know practically nothing of the natural history of the yaws *Spirochaete*, and in my opinion we are not justified in regarding any case of yaws as cured until a long period of time—say, ten years—has elapsed without recurrence. Even then the question of reinfection will have to be considered, and may obscure the result.

That many patients who would otherwise have died of yaws or its sequelae have been saved by these drugs is unquestionable, and in Fiji, at all events, the correct use of the drug may result in giving a new lease of life to a dying race.

ICE IN THE TREATMENT OF PNEUMONIA.

By L. Clarke Webster, L.R.C.S., L.R.C.P., Ed., L.F.P., S.G.

Gentlemen,—Professor Osler says, " Pneumonia is a self-limiting disease, which can neither be aborted nor cut short by any means at our command. . . . There is no specific treatment for pneumonia."

In this paper I do not for one moment wish to dispute such an authority, nor am I putting forward any new method of treatment; but in view of the very low mortality of a series of nearly a hundred cases treated by me in the manner to be described I think it should be of interest to the profession.

When taking out my class of lectures on the practice of medicine at Edinburgh, under Dr. Alexander Bruce, he strongly recommended the use of ice in the treatment of pneumonia. Professor Osler also strongly recommends it to prevent the onset of cardiac weakness in pneumonia.

On the authority of two such eminent men I determined to try ice as soon as I started practice. I did so, with the results to be presently shown. I will first deal with the methods of treatment. As will be seen, the drug treatment is nothing more than the usual routine treatment; but I insert it here to show that the credit for low mortality is due to the ice.

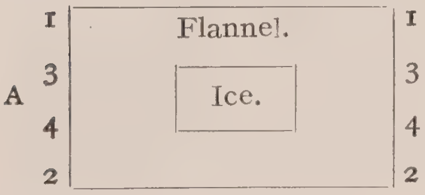
When the case is seen soon after onset, before secretion is established, and if pulse is full and bounding, I give tincture aconite with vin. ipecac. liq. am. acet., and sometimes with vin. antim added. When secretion is established, a mixture containing am. carb., vin. ipec., tr. digitalis, and senega every three hours. If secretion is not established after first day of treatment, aconite and antimony mixture is stopped and vin. ipec. am. acet. digitalis is substituted, assisted by steam-inhalation with tr. benz. co. Calomel given first night of treatment, unless patient is a blonde. I overlooked this last precaution in regard to blondes in one case, and found my patient, aetat eighteen years, salivated with a single 2 gr. dose.

Alcohol.—I give whisky as a routine in all cases; and have found not the slightest ill effects with it, but quite the reverse. I usually start it on the second day of the disease—to children, ½ to 1 dr. every three or four hours; to adults, 2 dr. to ½ oz. every three or four hours. In urgent cases I increase the dose and frequency, and find it has a wonderful effect in bucking the heart up when there are signs of failure. Alcohol is continued up till the day of convalescence.

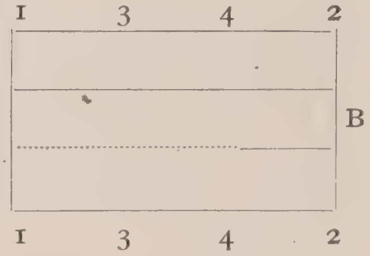
Hydrotherapy.—If temperature is 101° F. or over, ice is applied over affected part for two or three hours at a time, left off for the same period and reapplied. According to the severity of the case, this is continued night and day whilst temperature remains at or above 101° F.

Cold sponging of whole body is carried out every two to four hours throughout course of disease. If temperature remains very high—105° or over—I find a block of ice rubbed over the body, instead of cold sponging, is grateful to the patient, and rarely fails to bring down the temperature to safer limits. If the pulse is irritable, or very quick, or there are signs of failure evident, an ice poultice is applied to the heart until relief is obtained, which is usually very quickly. If pleurisy is present an ice poultice is kept on over the seat of the pleurisy.

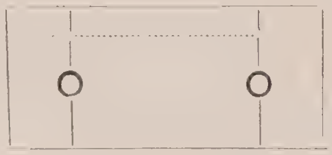
At the outset of my trials with ice I used an ice-cap or ice-bag, but very soon discarded it. I found that shortly after the bag was applied it became a hot poultice instead of a cold one. The method adopted since is as follows: Take a piece of ice about the size of the closed fist, or bigger; smash it up into smaller pieces by means of a hatpin or similar weapon; place the ice in the centre of a towel; gather up the ends as a handle, and bang the end containing ice on a stone or wooden step, or solid floor, until about the size of hail. Next take a piece of flannel about 18 in. by 12 in., spread crushed ice in centre of this about as thick as a linseed poultice, and fold as follows:—



Fold 1–1 to 4–4 } gives
Fold 2–2 to 3–3 } this:



Then fold 1–1 to 3–3 B } gives C
fold 2–2 to 4–4 }



O Safety-pins.

Apply poultice to part required, with folded ends away from patient. The object of this folding is to enable the nurse to replenish the ice when necessary, without removing the flannel or disturbing the patient. Always have a towel laid alongside the patient on the side on which the ice is applied, to catch the water from the melting ice. *The smaller the ice is smashed the less water runs away.* The heat of the body seems to absorb the moisture. Some nurses and those looking after patients often worry about the wetting of the patient's bed-clothes, &c. I have often seen the bed-clothes very wet as well as the sleeping-attire, but have never yet seen the slightest ill effects from it. Of course, instructions are always given to dry the patient and change the wet clothes as soon as the ice is removed.

I trust my confrères will pardon all these details, but I wish to make everything as clear as possible, in the hope that if ice has been used before and given up it may be tried again in the manner here described.

Unfortunately, in a large number of my cases I kept no records; and in others the nurse, or those in charge of patient, destroyed the charts. Had I ever had the slightest intention of publishing my results I would have kept complete records of all my cases. I submit herewith an analysis of fifty-six cases of which I have records. Of these fifty-six cases ten terminated by lysis, forty by crisis, and six deaths.

Cases ending by Lysis.—On the fourth day, one case; fifth day, two; seventh day, one; ninth day, three; tenth day, one; twelfth day, one; and ? day, one terminating with bronchiectasis.

Cases ending by Crisis.—On the fourth day, five cases; fifth day, six; sixth day, three; seventh day, five; eighth day, four; ninth day, three; tenth day, three; eleventh day, one; sixteenth day, one.

Ages of Cases.—Broncho-pneumonia: One month, two months, sixteen months, twenty-one months, two years (three), two years and a half (two), three years (four), three years and a half, five years, six years (three), seven years, nine years. Lobar pneumonia: Two years, two years and a half, four years (two), five years, five years and a half, six years, eight years, ten years, sixteen years (two), seventeen years, eighteen years, twenty-one years (two), twenty-two years, twenty-six years, twenty-seven years (two), thirty-three years (two), thirty-five years (two), thirty-six years, forty years (two), forty-two years, forty-five years, sixty years (three), seventy years, seventy-five years, seventy-eight years.

Mortality.—According to Osler, the death-rate of broncho-pneumonia is 30 to 50 per cent.; with ice, 10 to 15 per cent.: lobar pneumonia, 20 to 40 per cent.; with ice, 4·29 to 8·3 per cent.

I have official records in my death-certificates of all cases which were fatal, and six is the sum total of deaths out of nearly a hundred cases. However, as I have no records of the other forty-four cases, I intend only calculating my percentage on the fifty-six cases of which I have records. Out of the twenty cases of broncho-pneumonia, three deaths; thirty-six cases of lobar pneumonia, three deaths; of the forty-four cases not recorded, no deaths.

Lobar pneumonia: Two to ten years, nine cases, no deaths; nil. Ten to twenty years, four cases, no deaths; nil. Twenty to fifty years, seventeen cases, two deaths; 11·76 per cent. Sixty to eighty years, six cases, one death; 16·6 per cent.

Broncho-pneumonia: One month to two years, seven cases, three deaths; 42·86 per cent. Two to nine years, thirteen cases, no deaths; nil.

Broncho-pneumonia: Twenty cases, three deaths; 15 per cent. (20 + 10) = thirty cases, three deaths; 10 per cent.

Lobar pneumonia: Thirty-six cases, three deaths; 8·3 per cent. (36 + 34) = seventy cases, three deaths; 4·29 per cent.

The ten cases of broncho-pneumonia and thirty-four cases of lobar pneumonia added are the proportion of each of forty-four cases, making one hundred cases treated. One hundred cases grouped together, six deaths; 6 per cent.

Baby W.: One month old. Broncho-pneumonia. Patient only seen once, on third day of disease. Died same night.

Baby C.: Two months. Broncho-pneumonia. Died twelfth day; heart-failure.

Mrs. P.'s child: One year nine months. Double broncho-pneumonia. Empyema. Operated on for empyema on fifteenth day. Died ten days later.

Mrs. H.: Forty years. Acute pneumonic phthisis. Died ninth day. Patient had been under treatment in General Hospital two years previously for phthisis. This history given just before death by consultant. Case developed apparently as a lobar pneumonia until profuse sweating developed. I should not really include this.

Mr. B.: Seventy-five years. Lobar pneumonia. Seen on fourth day of disease; once only. Died two days and a half later, of heart-failure.

Mr. B.: Thirty-six years. Double lobar pneumonia. Pleurisy, complicated with enteric fever. Died about twelfth day of disease. Patient had been thrown from his horse twice in the twelve months prior to his death. Had neglected himself very much since his falls, and was completely run down before developing the disease.

I know the ice treatment has been condemned by many medical men as a failure in the treatment of pneumonia. In a splendid paper delivered before one of the learned medical societies in England a few months ago on pneumonia the lecturer said of the ice treatment " that its use had apparently not been successful, as it did not seem to have gained ground amongst the profession."

I claim for the ice treatment (as I have seen it) that one can accomplish more with it than with any other form of treatment.

With ice one can accomplish the following much-to-be-desired ends: Ice steadies the pulse, quickens the heart if irritable and stimulates it if failing, reduces the temperature, relieves the pain of the acute stage of the pneumonia, relieves the pain of pleurisy quicker and more effectively than any other method, and gives a lower death-rate. It can be applied to the youngest or oldest patient without the least fear of untoward results occurring. I have applied it in at least two cases where the patients were almost moribund, and they both picked up quickly after the ice was applied.

In view of all these facts I do not hesitate to put forward a plea for a more extensive trial of ice for pneumonia.

REPORT OF THE ANTI-TUBERCULOSIS DISPENSARY, SYDNEY.

By the Members of the Honorary Staff.

On the 16th September, 1912, the Anti-Tuberculosis Dispensary was opened at the Haymarket, Sydney, by the National Association for the Prevention and Cure of Consumption. A Government grant of £500 enabled the Association to commence work. This amount was increased by a generous gift of £500 from the Walter Hall Trust, and further sums of £200 from the Walter and Eliza Hall Bequest, and a number of private subscriptions.

The institution is for the use of the sick poor only, and is administered solely by a Committee of the National Association for the Prevention and Cure of Consumption (Sydney).

The institution is open for the reception of patients on two afternoons and two evenings in each week, and two Honorary Physicians attend at each session.

Two nurses are employed permanently, one of whom visits the homes of patients within a radius of fifteen miles. She observes the hygienic conditions under which the patients live, and takes note of the number and names of other inmates in the house who have been associated in any close degree with the patient. These persons she urges to attend at the Dispensary for examination.

She instructs occupiers in the ordinary rules of hygiene, and returns later to see how far her instructions have been carried out.

No trouble has been experienced in this connection, the patients being uniformly anxious to know the best means of safeguarding themselves from the risk of infection.

Contacts are tested by means of hypodermic injections of Old T. (Koch) and by the cutaneous method of V. Pirquet.

The Honorary Physicians do not visit patients in their own homes, nor does the institution agree to look after bedridden patients. These cases, together with those with a high degree of fever, are sent on to one of the sanatoria for treatment.

Treatment is given by means of T. administered hypodermically, Koch's Old T., P.T.O., P.T., B.E.T.O.A., and Beraneck's being mainly used.

All patients already under the care of a medical man are required to bring a communication sanctioning their treatment at the Dispensary. Medicines are prescribed and given free to those unable to pay. An arrangement has been entered into with a well-known chemist, who supplies mixtures, &c., at low rates.

Malt is also given to those requiring it.

No dispensing is done on the premises.

During the first year of working 839 new patients presented themselves.

Contacts who desired examination numbered 114. Of these, 102 were tested hypodermically with Koch's O.T., and the result showed that forty-three reacted positively, or 42·15 per cent. Of eighty-three patients (mostly children) tested by the cutaneous method of V. P., thirty reacted positively, or 36·14 per cent. The number of sputa examined was 382. The number of patients actually under treatment on the 16th September, 1913, was 346, of which 248 were being treated with T. Eighty-six patients were sent to sanatoria and thirty-three to the country.

Amongst the patients who have presented themselves for examination there have been many who were too far advanced in the disease for any hope of recovery to be held out to them. Of these cases it has been since ascertained that ten have succumbed to the disease.

Although insufficient time has elapsed to allow us to speak of patients having been cured, many cases have already shown marked improvement, and great changes for good have appeared in the methods of hygiene adopted in all the visited homes, the occupiers of which, albeit anxious to learn, had never hitherto had the necessity for the strictest sanitary and hygiene cleanliness demonstrated to them. Moreover, many persons crippled by the disease have been enabled to resume their occupations.

Appended are copies of all forms, &c., used in the work of the Dispensary.

F. S. W. Zlotkowski,
G. L. O'Neill,
F. G. Griffiths,
P. Boelke,
E. L. Rutledge,
H. Flecker,
L. H. L. Harris,
Hon. Staff.

TREATMENT OF MEDICAL TUBERCULOSIS IN INFANCY AND CHILDHOOD.

By Dr. McDonald Gill (Sydney).*

Introduction.

When I received Dr. Sweet's invitation to open the discussion on this subject I felt a certain amount of hesitation, as I had read a paper on the same subject at the last Congress, and had very little of what was new to add. However, the difference of opinion amongst medical men as to the value of tuberculin treatment being as well marked as ever, I felt that such a discussion should prove very useful.

A few words on the mode of entry of the tubercle bacillus into the human body will first be advisable. Without wishing to appear unduly dogmatic, I am strongly of opinion that infection almost invariably takes place by the air-passages, the primary seat of the disease being usually the bronchial lymph-glands. Infection by the bowel is rare. Nevertheless, one should endeavour to obtain a milk-supply free from tubercle bacilli, as surgical tuberculosis (so called for convenience) is apparently not infrequently due to the bovine type of bacillus.

Treatment.

Since the year 1908 I have been a firm believer in the value of tuberculin treatment. In my paper read before the 1911 Congress I gave details of seven cases treated in this manner. My first was treated in 1907. Since then I have adopted the treatment in all suitable cases. That the number of such is not very great is shown by the fact that by 1911 I had only had seven cases. Since then I have continued the use of tuberculin, and am quite satisfied that it is the most useful therapeutic agency we have for this disease. All the cases we have had have benefited. There are certain limitations to the treatment, which account for the comparatively small figures given. The most important of these limitations is time. The tuberculin treatment takes time to act. It is therefore, as a rule, unsuitable in acute cases, which form a large percentage of tubercular cases in childhood. Again, tubercular meningitis is probably the most common form in which tubercle presents itself to the physician in childhood. I have never attempted to treat such a case. On the other hand, the treatment in my hands has been much more successful in children than in adults, the reason being that the capacity for growth and the healing-power in childhood are exceedingly active.

Plan.

The plan we adopt is this: Tuberculin is administered in courses. Each course lasts three months. If at the end of this period it seems that the child would be benefited by further treatment we recommend a second course. As a rule, one course is enough. We generally use Koch's new tuberculin (T.R.). A very small dose should be used at the beginning—say, 4 minims ($\frac{1}{4}$ cc.) of a 1-in-2500 dilution. The injections are given twice a week at first. The dose is increased about

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* Owing to the unadvoidable absence of Dr. McDonald Gill, this paper was read by Dr. W. F. Litchfield.

50 per cent. each time, till the larger doses which produce a reaction are reached. The injections are then given once a week, and increased more gradually, the object being not to avoid a reaction, which is not possible, but not to exhaust the child. We generally reach a dose of about 1 to 2 milligrammes of solid substance, T.R.—that is, about one-tenth to one-fifth of the contents of a single bottle. As a rule, this is about as much as a child can comfortably tolerate. Tuberculin has a tonic effect, which generally appears in about two or three weeks, and becomes more marked as the treatment continues. B.E. can be used instead of T.R., but is a much stronger preparation, and should therefore be used in smaller doses.

Other preparations are apparently equally effective, but having found these so satisfactory I have not felt disposed to go beyond them. Wright's method of using minute doses of tuberculin, controlled by the opsonic index, I must confess never appealed to me, and I have never felt inclined to make use of it. No harm results from a reaction; even a severe reaction is recovered from in twenty-four hours, as a rule.

Difficulties.

There are certain difficulties in carrying out the treatment occasionally met with. In rare cases we meet with a condition of heightened sensitiveness. I have only met with one case, and that not a child. This was a boy of seventeen years, who had improved greatly after two courses of tuberculin treatment. Being an advanced case, with considerable cavitation of the lung, I thought that further tuberculin treatment would be advisable. It was then that he developed this increased sensitiveness. After every injection he complained of feeling very ill, and always developed a reaction, although I repeatedly diminished the dose. Finally I had to discontinue the treatment. The boy died about six months later. Cases of this kind are rare, although most writers on tuberculin treatment discuss the difficulty. Once developed, the only remedy seems to be to stop the injections. The phenomenon appears to be nearly related to anaphylaxis. Occasionally we meet with patients unduly sensitive to tuberculin, even in small doses. I have met with one such—an adult. Probably in such a case one would have to be content with the small doses.

In this paper I have only dealt with the practical side of the subject; the theoretical side is for the pathologist. Whatever the exact *modus operandi* may be, I can confidently recommend its use in childhood. It is simple and easy to administer; the child need not be taken from home; and, finally, it is absolutely safe and harmless when properly administered.

DISCUSSION.

Dr. Bruton Sweet said his remarks would deal almost entirely with tuberculin treatment. When writing to Dr. Litchfield about eighteen months ago with reference to subjects suitable for discussion in the Diseases of Children Section he suggested the tuberculin treatment of medical tuberculosis in childhood as a suitable subject. He did so because, having met with considerable success from this form of treatment, he was anxious to learn the views of other men, and to ascertain whether their results were equally satisfactory. Somewhat to his surprise, Dr. Litchfield wrote, " Tuberculin treatment is only on its trial here, and I do not think any of our men could say very much about it, except that on the whole it had been disappointing. A better title to provoke a good discussion would be ' Medical and Surgical Tuberculosis in Childhood, including Tuberculin Treatment.' " He found, however, that Dr. McDonald Gill confined his remarks entirely to this form of treatment, and wished to do the same. Although they both obtained the same happy result—viz., the cure of the patient—the speaker noticed that Dr. Gill's and his methods were somewhat different. He had always used Sir Almroth Wright's method of minute doses, and in his first two cases the opsonic index was taken and used as a guide to dosage and interval between injections of tuberculin. The information obtained from these cases had served as a guide in later cases, and he had now dispensed with the opsonic index as unnecessary. T.R. prepared by Allen, of London, was always used, and a dosage of 0·00001 cc. commenced with. He had never found it necessary to give a larger dose than 0·00003 cc. Bovine T.R. was used in most cases—in some mixed bovine and human T.R.—and in only one case, where the infection was undoubtedly of human origin, was human T.R. used. As regards interval between doses, as before mentioned, in his first two cases he had been guided by the patient's opsonic index, and gave the second dose ten days after the first, and the third fourteen days later. Further doses were given at fourteen days' interval until towards the end of the treatment, when the little patient was apparently well, and then one or two doses were given with an interval of three weeks. This interval between doses he now made an invariable rule. The average duration of treatment was five months, and the number of injections ten. Results of treatment were most gratifying, and in some of his earlier cases exceeded his most sanguine expectations. In fact, the results had been so uniformly good that he now gave, in nearly all forms of medical tuberculosis, a hopeful prognosis, in marked contrast to the gloomy forecast of former years, before tuberculin treatment was used. One marked exception to this rule was in the case of tuberculous meningitis, in which he was convinced (despite the opinion of Nathan Raw, who claimed to have cured some of these cases with tuberculin) that here tuberculin could do no good. His experience of this form of treatment was not very considerable, but he had treated twenty-two cases. Fourteen of these were private patients, and of these—nearly all of whom were in an advanced stage of the disease—eleven were now alive and in perfect health. One improved for a time, but relapsed, and died six months later ; one developed miliary tuberculosis, and died whilst under treatment ; and one recovered, got fat and strong, but died a year later of nephritis. Eight were treated in hospital, and of these, six made apparently a complete recovery, but had not since been traced ; and two died. Of the private cases, in five the abdominal organs were chiefly affected—*i.e.*, were cases of tubercular peritonitis or affections of the mesenteric glands ; in seven the thoracic organs were chiefly affected—*i.e.*, disease of the bronchial and tracheal glands, plus in some cases involvement of the lung-substance (in two at least there were definite physical signs of cavity-formation) ; one was a case of tuberculous iritis, plus involvement of the mesenteric glands ; and in one the glands of the neck were apparently alone affected. Of the hospital cases, in four the abdominal organs were mainly affected and in four the thoracic organs. As a result of the study of the above small series of cases seen by him during the last six years he had formed the following conclusions: (1.) Tuberculosis, either medical or surgical, in childhood was not common in New Zealand. (2.) *Prevalence of tuberculosis in New Zealand among young children was greater in rural than in urban districts. (3.) 75 per cent. of these cases were probably of bovine origin. (4.) Improvement from tuberculin treatment was rapid, and dated from the first injection. (5.) Tuberculin in small doses acted as a powerful tonic, causing rapid increase in weight, with improvement of appetite and general well-being. (6.) Tendency to relapse after treatment was discontinued was very slight.

Professor Champtaloup (Dunedin) expressed some doubt as to the high percentage of bovine infections in juvenile tuberculosis as outlined by Dr. Sweet, and asked for particulars. He wanted to know whether Dr. Sweet based his figures on clinical or laboratory data. He mentioned that Fraser, working on the material of the Sick Children's Hospital, Edinburgh, had found upwards of 60 per cent. of the tubercular lesions to be due to the bovine type of bacillus, and these figures had been considered very high by some German investigators. From his experience in Otago, Professor Champtaloup thought that there was a much lower percentage of bovine infections in childhood than obtained in Continental countries, but he emphasized the point that in presenting statistics or figures for any particular district or province in New Zealand investigators should make it quite clear that their figures did not refer to New Zealand as a whole, because what applied to a particular locality might give a very erroneous picture for New Zealand. As a laboratory worker, he thought Dr. Sweet's percentage of bovine infections too high. Referring to the treatment of juvenile tuberculosis by tuberculin, Professor Champtaloup drew attention to the necessity for using freshly diluted tuberculin in preference to the diluted preparations on the market, for the latter were uncertain in their action if diluted more than a few weeks previously. While advising caution in the use of tuberculin, he referred to one case of generalized subcutaneous tuberculosis in which the infecting bacillus was of human type, which had responded immediately to increasing doses of P.T.O., and in which a remarkable cure had been effected by its use. Previous treatment without tuberculin, extending over several months, had had no beneficial effect on the child.

Dr. W. F. Litchfield (Sydney) said he had not found tuberculin of much benefit in surgical tuberculosis, nor did it appear to have any virtue in acute generalized tuberculosis, or tubercular meningitis, or in tubercular broncho-pneumonia. Phthisis or chronic pulmonary tuberculosis was rare in childhood, and the question of the use of tuberculin in it need not be considered. In tuberculosis of the bronchial glands and in tubercular pleurisy, however, he had used tuberculin frequently, and with apparent success; but it was necessary to remember that these cases frequently improved without the aid of tuberculin.

Dr. A. Pentland (Singleton, New South Wales) wished to emphasize that we should consider the type of disease we meet with in Australasia before blindly applying Old Country rules. In the country parts of New South Wales, where the large majority of our consumptives were, the complaint was a family one, more than half his tubercular patients

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* The majority of these cases came from country districts; at least eight were living on dairy farms.

belonging to consumptive families. They were not decreasing in numbers, nor were the consumptive families dying out, but the deaths occurred at a much later age than they formerly did. Members of consumptive families married young, and had fair families: they were of the "clinging vine" type. The children showed a partial immunity to tuberculosis from the start; they recovered in a marvellous manner from the glandular manifestations of childhood, the pleurisies and joint-troubles of youth, and the lung-troubles of later life. Such children, full of tubercular foci, stood surgical interference badly. It depresses their vitality, and one never knew what might be stirred up. As regards tuberculin, after using it regularly since 1891, he found himself perhaps less enthusiastic and certainly less willing to give a dogmatic opinion about it than he did twenty years ago.

The following also took part in the discussion: Professor Colquhoun (Dunedin), Dr. Washbourne (New Zealand), Dr. Jeffreys Wood (Melbourne), and Dr. Sinclair Gillies.

SOME REMARKS ON TUBERCULOSIS OF THE BRONCHIAL LYMPH-GLANDS.

By F. Guy Griffiths, M.D. (Sydney).

The bronchial lymph-glands (*Lymphoglandulae bronchiales, Ganglions prétrachéo-bronchiques*) are made up of the following groups:—

1 and 2. The right and left superior tracheo-bronchial glands (*L. tracheobronchiales superiores dextrae et sinistrae, Ganglions prétrachéo-bronchiques droits et gauches*) lie on each side of the trachea above the main bronchi in the angles which the two latter make with the trachea. Two chains of small glands lie one on each side of the trachea in its cervical course; they are sometimes considered to constitute parts of these groups, but as they drain other organs foreign to the respiratory system, and are situated not in the mediastinum, but in the neck, they are better described in a separate group as *L. praetrachiales* and *paratrachiales;* they anastomose with the superior tracheo-bronchial glands.

3. The inferior tracheo-bronchial glands (*L. tracheobronchiales inferiores seu bifurcationis, Ganglions intertrachéo-bronchiques*) lie below the trachea in the angle between the two bronchi, behind the manubrium sterni, and in front of the body of the fifth thoracic vertebra; they usually extend farther to the right than to the left.

4. The broncho-pulmonary and pulmonary glands (*L. broncho-pulmonales et pulmonales, Ganglions inter-bronchiques*) occupy the angles of division of the bronchi and bronchioles down to their fourth or fifth bifurcations.

The bronchial glands drain the lungs, the visceral pleura, the bronchi, and the lowest part of the trachea; and possibly also the diaphragmatic surface of the heart and the oesophagus.

Time will not permit a discussion of the relations of particular lobes to particular groups; they are to be found in Sukiennikow's article.

Their efferent lymphatic vessels unite with the efferents of the anterior and posterior mediastinal glands to form the trunchus broncho-mediastinalis, which discharges into the thoracic (or right lymphatic) duct, or separately into one of the large veins at the root of the neck. They may communicate with the prae- and para-tracheal glands, and sometimes with the anterior and posterior mediastinal groups; they do not communicate with the inferior deep cervical glands.

The lymphatics of the head and neck, including the larynx, the upper part of the trachea, the pharynx, the tonsils, and the thyroid gland, discharge ultimately into the deep cervical glands, and thence by the jugular lymphatic trunk into the thoracic (or right lymphatic) duct, or one of the large veins at the root of the neck. They communicate with the highest mediastinal glands, but not with the bronchial glands.

The trachea, larynx, thyroid and middle third of the oesophagus drain into the prae- and para-tracheal glands, and these latter may communicate with the tracheo-bronchial glands.

The relations of the lymphatics of the lungs with those of the neck and abdomen were examined at length by Most, who reported on the subject to the Sixth International Tuberculosis Congress at Vienna, in 1907, that: (1.) The lymphatics of the neck do not lead to the pleura, lungs, or bronchial glands. (2.) That there is no direct communication of the lymphatics of the abdominal system with the lung, pleura, or bronchial glands; they may, however, communicate with the posterior mediastinal glands.

Section 2.—We thus see that it is almost impossible that the bronchial lymph-glands may be infected with tuberculosis from any source other than the mucosa of the bronchi and lungs. It is, of course, always possible that bacilli from any port of entry may reach the lung by a circuitous course after passing through lymphatic vessels and glands, the large veins at the root of the neck and the right side of the heart; but tuberculosis of a bronchial gland invariably means tuberculosis of the region drained by that gland (Parrot's Law, Ghon, Most, Küss, Hamburger, Still). The results of inhalation and feeding experiments, which I have examined elsewhere, confirm these views; if particles are fed to guinea-pigs without due precautions to prevent their entrance into the trachea, some of them will afterwards be found in the lungs; but with due precautions pulmonary infection is negligible. A small number of tubercle bacilli are required to infect a guinea-pig by inhalation—five hundred thousand times as many are required to infect it by feeding.

Most and Ghon have shown that in the lung, as elsewhere, the stream in the lymphatics flows centripetally; there is no back flow. Cancer-roots may permeate lymphatic channels against the stream (Sampson Handley), bacteria cannot.

Section 3.—The tubercle bacilli found in bronchial glands are almost invariably of the typus humanus. Numerous investigations, the results of which I have collected elsewhere, show that 6, 10, possibly in children even 20, per cent. of cases of tuberculosis of glands in other parts of the body may be due to the typus bovinus; not so in the case of bronchial glands, the infecting bacillus is of the typus humanus.

Section 4.—It has recently been stated by Hamburger and Holt that tuberculosis is essentially a disease of children, and that very few escape infection. Whatever may be the case elsewhere, this does not obtain in Australia. I have tested numerous children, even of tuberculous stock, by subcutaneous injection of tuberculin with negative results; at some post-mortem examinations of children dead from other causes—*e.g.*, intestinal obstruction some months after "successful" operation for appendicitis—I have failed to find any enlargement of the bronchial glands.

Section 5.—Where infection has occurred in childhood it may remain latent for years. As in the case of cervical adenopathy, the microbe may be of low virulence, and the disease may remain strictly localized. Metchnikoff has gone so far as to suggest that scrofula is usually due to a virulent tubercle bacilli of the typus humanus, that they exert an immunizing effect, and that it is to the frequency of such infections in youth that urban populations owe their increasing immunity to tuberculosis. Unfortunately, however, latency is not extinction, and exacerbations are produced by depression of the general health or by the intercurrent pulmonary affections associated with such diseases as measles, whooping-cough, scarlet fever, diphtheria, influenza. Recently in Sydney we have had many opportunities of studying deep-seated pains in the chest associated with vaccinia; some of these may be pleuritic, others I attribute to swellings of bronchial glands already the seat of tuberculosis.

Section 6.—Of all forms of tuberculous adenopathy the bronchial is the commonest, much more common than either mesenteric or cervical. It is liable to suppuration.

I do not propose to discuss the morbid anatomy.

Section 7.—Symptoms and Signs: As I have already said, the disease may be latent and symptomless. Only when the swelling is considerable is evidence forthcoming; great swelling is unusual in adults. The most striking symptoms are general—malaise, lassitude, loss of flesh and of appetite, pallor, feverishness, tuberculous rheumatism. The local symptoms and signs are very numerous, and are due mostly to pressure of the enlarged glands on the neighbouring parts, nerves, veins, bronchi, oesophagus—*e.g.*, dry, hacking, paroxysmal, clanging cough; swelling of the superficial veins, small venous varicosities in the skin over the seventh cervical and the first three thoracic vertebrae, oedema of the eyelids, &c., cyanosis, the venous hum of Eustace Smith; dyspnoea, stridor inspiratory or expiratory, dullness on percussion, chuchotment of D'Espine, deficient breathing; prominence on the walls of a bronchus, as seen by the bronchoscope, dysphagia and partial occlusion of the oesophagus, as felt by the bougie. Should perforation occur into a bronchus or blood-vessel, or into the mediastinum, oesophagus, pericardium, or pleura, a fresh train of symptoms will of course arise. On Röntgen-ray examination shadows of the glands may be seen about the hilus of the lung. The patient reacts to a test dose of tuberculin. I propose to say a few words about some of these signs, but not to discuss all in detail.

Tuberculous rheumatism is one of the commonest features of pulmonary or of bronchial tuberculosis; the toxin absorbed from the lesion circulates in the body and produces aches and pains in other parts, especially in joints and fasciae. Further, the glands, as Koch pointed out thirty years ago, rarely act as perfect filters; some bacilli pass through into the distal lymphatic vessels, thence into the veins and the general blood-stream, and are ultimately deposited in distant organs, especially joints, bones, and genito-urinary organs, where they cause the so-called "surgical tuberculosis"; it is because the bronchial glands infected by bacilli of the typus humanus act as the distributing centre for so much tuberculosis in other parts that we find most forms of surgical tuberculosis due to the typus humanus, and not to the typus bovinus, which is present in no more than 20 or 25 per cent., even of cases of surgical tuberculosis in children.

The dry, hacking, paroxysmal, clanging cough is one of the most constant features; it may be mistaken for whooping-cough.

In addition to the well-known swellings of superficial veins of the neck and anterior part of the chest, Lombardi has recently described small venous varicosities in the skin over the seventh cervical and the first three thoracic vertebrae, Lombardi's varicose zone of alarm.

I have seldom been able to hear the venous hum over the manubrium sterni when the chin is stretched up; Dr. Eustace Smith described this sign many years ago, and still insists on its extreme value; Dr. Still has generally been able to find it, but other writers describe it as of rare occurrence. It is produced by pressure of the swollen glands on the innominate vein.

Dyspnoea is sometimes a prominent and distressing feature, and is sometimes mistaken for asthma; it may be associated with loud stridor, either inspiratory (Still) or expiratory (Schick).

Dullness on percussion may be detected over the manubrium sterni, between the scapulae (paravertebral dullness of Dautwitz), or over the spinous processes of the vertebrae. Auenbrugger described the thoracic spines as resonant, but the fifth is usually dull in health, and the third and fourth, and perhaps others as well, in enlargement of the bronchial glands. It may be difficult to identify the spines; the most prominent spine at the root of the neck is not always that of the vertebra prominens; the sixth cervical or the first thoracic may be most evident; when there are three prominents pines the vertebra prominens is usually the middle one of the three; sometimes it may be necessary to count upwards from the fifth lumbar vertebra.

Professor D'Espine, of Geneva, describes what he terms "chuchotment" as the most constant and valuable of all signs; the chest-piece of the stethoscope is applied over the second or third thoracic spine, and the patient is asked to say thirty-three; in addition to the usual bronchophony, one hears a whispered reinforcement if the glands be enlarged.

When the enlarged glands press firmly on a bronchus so as to bulge into it they interfere with the entrance of air into the corresponding lobules, and the breath-sounds are deficient; if a gland project far into the cavity of a bronchus it may block it, and the breath-sounds are then absent over the corresponding area. Such prominences on the walls of the larger bronchi may be seen in Killian's direct bronchoscopy.

If the incidence of the enlarged glands be chiefly upon the oesophagus there may be dysphagia, and according to Neisser the swellings may be felt with the oesophageal bougie.

On Röntgen-ray examination, shadows of the enlarged glands, especially if they be calcareous, may be seen about the hilus of the lung. One must not, however, assume that all shadows seen in this region are due to this cause; the larger bronchi, especially if they contain much secretion or their mucosa be oedematous, throw shadows, and so, too, do the pulmonary arteries and veins.

Section 8.—A matter of great interest is the relation of tuberculosis of the bronchial glands to tuberculosis of the lung. (*a.*) As we have seen, the primary lesion is a small ulcer in the mucosa of a bronchus or bronchiole, or possibly in an alveolus (Koch, Cornet, Hamburger, Parrot, Birch-Hirschfield, Ghon, Still, Holt, Woods Hutchinson). (*b.*) This gives rise to tuberculosis of the corresponding bronchial glands, the secondary lesion. The degree of swelling of the glands bears no relation to the size of the primary lesion. Not only do we fail to find bronchial tuberculosis without a pulmonary lesion, but this latter is always in the region drained by the particular gland affected (Most, Ghon, Hamburger). (*c.*) This secondary lesion may sometimes cause a tertiary lesion in the lung, the method of production varying in different cases. Thus, some authorities believe that there may be a back flow through the lymphatic vessels from the gland to the lung—*i.e.*, a lymphatic infection. Most and Ghon have shown, however, that this does not occur ; according to them, a centrifugal lymphatic flow is unknown.

A second possible method of production of a tertiary lesion or lesions is by means of direct extension of the disease from the gland in the hilus to the substance of the lung (hilus disease). As Cornet stated twenty years ago, this doubtless sometimes occurs—*i.e.*, when a suppurating gland perforates into the pulmonary tissue. Lately, however, this idea has fascinated various writers, who have rushed to the extreme of declaring that early apical tuberculosis is rare, and that hilus disease is the form in which tuberculosis of the lung usually occurs. I believe they are mistaken ; they have overlooked the primary ulcer, and have mistaken shadows of vessels and of bronchi for shadows of glands. I believe that root phthisis does occur, but not commonly.

There remain two other methods by which the tertiary lesion in the lung is more commonly produced from the glandular disease. The bacilli may permeate the gland, pass through lymph vessels into veins, as in the case of surgical tuberculosis described above, and so reach the heart and be carried to the lung (haematogenic tuberculosis) (Koch, Adami) ; or, if a caseous gland ulcerate into a vein, the same may occur, but usually as a massive acute infection, part of a general miliary tuberculosis ; or the gland may discharge into a branch of the pulmonary artery, and the lung receive the infection directly.

Lastly, we may have broncho-pulmonary tuberculosis, resulting from the ulceration of a gland into a bronchus, the infection resembling the ordinary primary aerogenous pulmonary tuberculosis, where the lung is infected more directly from the exterior, and not by this circuitous route.

Section 9.—Differential Diagnosis: Of course, not all swellings of bronchial glands are tuberculous. They may be due to many of the acute infections—pneumonia, measles, typhoid, diphtheria, capillary bronchitis, &c.—but after these they usually subside. The chronic forms occur in lymphadenoma, syphilis, lymphosarcoma, &c. The golden key in diagnosis is the tuberculin reaction (Hamburger). With ordinary care there is little difficulty in distinguishing asthma, adenoid enlargement in the naso-pharynx, goitre, persistence of the thymus, and whooping-cough.

Section 10.—Treatment: The usual hygienic dietetic treatment is of value, but most valuable is tuberculin. It would take us too far afield to discuss now the best method of administering it. It is important that the clothing should be light and loose—very loose about the neck. There is less objection than most persons suppose to the so-called "pneumonia-blouse."

Young patients should be sedulously protected from excessive schooling and exciting amusements. From time immemorial sun-baths, especially at the seaside, have been commended. Solaria and arenaria were popular in ancient Rome. Lately there has arisen an enthusiasm, or shall we say an enthusiastic craze, for heliotherapy — treatment by direct sunlight. It is lavishly employed on flat house-roofs in Berlin, in open spaces in the Swiss Alps, and on the seashore. Doubtless, in moderation it is very useful, but in sunny Australia it can easily be overdone. A year or two ago a child died of sunburn at Manly Beach; and apart from this risk, languor, anorexia, headache, nervous exhaustion, may follow undue exposure. In hot climates air and light baths, with gentle exercise of the naked or very lightly clad body, are best taken in a large well-ventilated room. A dip in the surf should last only three or five minutes, and should not be followed by exposure of the head, or even the body, to direct sunlight.

Thoracic surgery advances apace, but fortunately no operative procedure has yet been elaborated for the excision of bronchial glands, and sufferers from bronchial adenopathy are not exposed to the risk, so imminent in the case of cervical adenopathy, of immolation on the altar of operative surgery.

REFERENCES.

Adami (and Nicholls). " Principles of Pathology." 2 vols. New York, 1910–11.

Albrecht, E. Quoted by Ghon.

Albrecht, H. Quoted by Ghon.

Auenbrugger. " Inventum Novum ex Percussione Thoracis Morbos detergendi," Vienna, 1761. Eng. trans. by John Forbes, M.D., London, 1838 (?).

Bandelier u. Roepke. " Die Klinik der Tuberkulose," Wurzburg, 1911.

Bandelier and Roepke. " Tuberculin in Diagnosis and Treatment," 2nd English edition, London, 1913.

Bartels, P. " Das Lymphgefasssystem," Jena, 1909 (Bardeleben's Anat. des Meneschen, bd. iii, ab. 4).

Birch-Hirschfeld. Deutsch. Archiv. f. Klin. Med., 1899, bd. 64, quoted by Ziegler, bd. ii, s. 814, and by Clifford Allbutt, B.M.J., 1899, ii, 1151.

Burnet. Quoted by Metchnikoff.

Cole. Radiographic Diag. and Classif. of Early Pulm. Tub., Am. J. of Med. Sci., July, 1910.

Cornet. " Die Tuberkulose," Am. edition, New York, 1904.

da Costa, jun., J.C. " Spinal Percussion in Dis. of Mediastinum," Am. J. of Med. Sci., December, 1909. Quoted by Ewart.

Dautwitz. " Die Diagnose, Spezif. Behandlung der latente endothorakalen Drusen Tuberkulose der kindlichen Alters," Beihefte zur Mediz. Klinik, h. ix, s. 242, 1908. Quoted by Robin.

Dickey, Stuart. " Applied Anat. of the Lungs," Belfast, 1911.

Dieulafoy. " Text-book of Medicine," 2nd English edition, London, 1912.

Engel. " Bronchial drusentuberkulose beim Kinde." Ergeb. der inneren Med. u. Kinderheilkunde, 1913, bd. 11. Quoted by Schlossmann, Z. f. Tub., bd. 21, s. 169, 1913.

D'Espine. " Tub. Bronchial Adenopathy," B.M.J., 1910, ii, 1136.

Ewart, Wm. " Dorsal Percussion," B.M.J., 1899, ii, 1168.

Ewart, Wm. " Percussion of the Vertebrae," B.M.J., 1910, ii, 1057.

Ewart, Wm. " Dorsal Apical Percussion," B.M.J., 1912, ii, 966.

Fraser. " Organism Present in Bone and Joint Tuberculosis in Children," B.M.J., 1913, i, 760.

Ghon, Anthon. " Der Primare Lugenherd bei der Tuberkulose der Kinder," Berlin, 1912.

Grenet. " Thacheobronch: Adenopathy in the Child," Ann. de Med. et Chirg. Infant, 1911, xv, B.M.J., 1912, i, e. 3.

Griffiths. " Studies in Pulmonary Tuberculosis," London, 1911.

Griffiths. " Tuberculous Rheumatism," A.M.G., 1912, ii, 647.

Griffiths. " Relation of Bovine to Human Tuberculosis," A.M.G., 1913, i, 275.

Hamburger. "Die Tuberkulose des Kindesalters," Leipzig, 1912.
Holt. "Diseases of Infancy and Childhood," ed. 6, New York, 1911.
Hüssy. "Sonnen u. Freiluft Behandlung der Tuberkulose," Corresp. f. Schweiz. Arzte, 1912, No. 19. Referat Z. f. Tub., bd. xix, h. 5, s. 506, 1913.
Hutchinson, Woods. Brit. J. of Tub., vol. vi, 1, 1912, p. 23.
Iselin. "Entgiftung des tub Herdes durch Roentgenbestrahlung," D.M.W., 1913, 297.
Jackson, Chevalier. "Tracheo-bronchoscopy," &c., St. Louis, Mo., 1907.
Jerusalem. "Heliotherapy in Tub.," B.M.J., 1912, i, e. 103.
Jordan. "Peribronchial Phthisis," B.M.J., 1912, ii, 484, and Practitioner, 1912, i, 248.
Klebs. Tuberculosis, New York, 1909.
Klebs. "Heliotherapy of Tub.," Brit. J. of Tub., vi, 4, 1912, p. 227.
Koch, Robert. "Die Aetiologie der Tuberkulose." Mitteil aus der k. Gesundheitsamte, Berlin, 1884. Eng. trans. by Sydenham Society, London, 1886.
Koch, Robert. Gesammelte Werke, Leipzig, 1912.
Kohler. "Tuberkuloseforschung," Z. f. Tub., bd. 20, h. 7, s. 736, 1913.
Kolle u. Hetsch. "Die Experiment, Bakteriol," Berlin, 1911.
v. Koranyi. "Spinal Percussion," Medical Congress, Budapest, 1909 (D.M.W., 1909, 1776).
Kraus. "Vegetations Storungen u. Tuberkulose," Z. f. Tub., bd. xix, h. 5, 1913, s. 425.
Kuss. "De l'Heredite Parasitaire de la Tuberculose Humaine," Paris, 1898. Quoted at length by Ghon.
Leslie. "Hilus Tuberculosis," Brit. J. of Tub., vii, 3, 1913.
Lombardi. Cited in B.M.J., 1913, ii, e. 299.
Mann. "Atlas of Killian's Tracheo-bronchoscopy," Wurzburg and London, 1911.
Metchnikoff. "Warfare against Tuberculosis," Bedrock, vol. 1, No. 4, p. 427, Jan., 1913.
Michalowicz. "Trachelbronchialdrusen Tuberkulose," Jahrb. f. Kinderheilk., bd. 21, h. 1. Quoted in D.M.W., 1910, 335.
Minnelle. "Heliotherapy," J. des Practiciens, xxvi, 1912. Quoted in B.M.J., 1912, 2, e. 59.
Moellers, B. "Zur. Aetiologie der Knochen. u. Gelenktuberkulose," D.M.W., 1913, 1826.
Monteuuis. "Air, Light, and Sun Baths," English edition, London, 1907.
Most, A. "Die Infektionswege der Tuberkulose," VI Internat. Tuberkulosekonferenz, Wien., 1907. Referat D.M.W., 1908, s. 46.
Nietner. "Modern Combat against Tuberculosis amongst Children," Lancet, Nov. 16, 1912.
Neisser. D. Archiv. f. klin Med., 1905, vol. lxxxvi, p. 28. Quoted by Sahli.
Parrot. Quoted by Dieulafoy (vol. 1, p. 388) and by Ghon.
Poirier et Cuneo. "Systeme Lymphatique" in Traite D'Anat. Humaine, par Poirier et Charpy, Paris, 1902.
Poncet et Leriche. "Heliotherapy," Bull. de l'Acad. de Med., Oct. 12, 1912. Quoted in B.M.J., 1913, ii, e. 12.
Pritchard. "Tuberculosis in Children," Practitioner, Jan., 1913.
Robin. "Traitment de la Tuberculose," Paris, 1912.
Rollier. "Heliotherapy in Tub.," B.M.J., 1913, 1, e. 80.
Sahli. "Diagnostic Methods," 2nd Am. ed., Philadelphia, 1911.
Schick. "Exspiratory Strider," D.M.W., 1909, 2040.
v. Schrotter. "Heliotherapic der Tuberkulose," Z. f. Balneol, 1912, h. 1–4. Referat Z. f. Tub., bd. 20, h. 7, 1913, s. 809.
Sewall and Childs. "Physical Signs and X-ray Pictures in Early Phthisis," Arch. of Int. Med., July, 1912. Cited in B.M.J., 1912, ii, e. 248.
Smith, Eustace. "Disease in Children," London, 1909.
Still. "Morbid Anat. of Tub. in Childhood," B.M.J., 1899, ii, 455.
Still. "Common Disorders and Diseases of Children," London, 1909.
Stoll. "Tub. of Bronch. Glands," Am. J. of Med. Sci., Jan., 1911. Quoted in B.M.J., 1911, i, e. 277.
Sukiennikow. "Topograph. Anat. der bronchialen u. trach. Lymphdrusen," Berlin klin Woch., 1903, s. 317, 347, 369. (Beautifully illustrated.)
Weber. "Die Bedeutung der Rindertub. f. menschlichen Tuberkulose," Z. f. Tub., bd. 19, h. 6, s. 521, 1913.
West. "Diseases of the Organs of Respiration," London, 1909.
White, Hale. "General Therapeutics," London, 1889.

Wilkinson, W. Camac. "Tuberculin in the Diag. and Treat. of Tub.," London, 1912.
Winternitz. "Heliotherapy," Am. trans. in Solis Cohen's "Physiological Therapeutics," Philadelphia. (I have not been able to see this work.)
Wolff-Eisner. "Fruhdiagnose und Tuberkulose Immunitat," Wurzburg, 1909.
Zabel. "Bronchialdrusen diagnostik," Munch. Med. Woch., 1912, No. 49. Quoted by Kohler.
Ziegler, Ernst. "Allgemeine Pathologie," Jena, 1905–6.
Ziegler u. Krause. "Rontgenatlas der lungen Tuberkulose," Wurzburg, 1910.

Since this paper was written I have seen the English translation, London, 1914, of the new edition of Cornet's "Scrofulose," and learnt that Rollier has published his collected papers in book-form, "Die Heliotherapie der Tuberculose," Berlin, 1913.

THE ADMINISTRATION OF CHLOROFORM.

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Analysis.

Chloroform when inhaled by man enters the air-passages, and is taken up into the blood. Herein is the key to its correct administration: We must concentrate first upon *chloroform*, its properties; next upon *man*, the personal equation; in particular, upon *airway* and *blood*—the two bodily parts with which chloroform first comes in contact, the two bodily parts upon which it directly acts.

Chloroform has a heavy pungent vapour, nearly four and a half times the weight of air. It decomposes fairly readily in the presence of air and sunlight. The *weight* and *pungency* of chloroform vapour must never be forgotten. They are two things which greatly make for danger when it is administered by inhalation to man.

Dangers of a Heavy Vapour.

Heavy vapours, such as choloroform, can interfere with respiration in two ways,—

I. They are extremely inert compared to air, and tend to collect in the middle airway (trachea and upper bronchi) in a dense plug. It is as though the middle airway were lightly packed with cotton-wool. It is plain that given such a plug in the middle airway the inrush of further air to the lungs is hindered. What happens? The pulmonary arterioles contract, damming back the blood in the pulmonary circulation. The pulmonary capillaries and the systematic circulation are starved of blood, and as a consequence the respiratory muscles, being underfed and overworked in the effort to counteract this interference with respiration, become exhausted.

II. Heavy vapours interfere with respiration in a second more direct way. Being so inert they need powerful respiratory movements to keep them circulating freely to and fro, into and out of the airway.

Respiratory movements, quite efficient where air is the atmosphere breathed, may be inefficient in an inert "chloroform air" atmosphere, where chloroform is present to excess.

In the above two ways, then, chloroform vapour, by its mere weight, may bring breathing to a standstill. It does this chiefly—(1) Where respiratory movements are initially weak, as in very feeble people, or in severe cases of emphysema; (2) where respiratory movements are temporarily weakened (*e.g.*, inhibited breathing of light anaesthesia prior to vomiting). This hindering of respiration by a heavy chloroform vapour in the airway is called the *physical action of chloroform.* Any mechanical obstruction in the airway will help chloroform to interfere in this way with the respiration. The pungency of chloroform vapour frequently creates such a mechanical obstruction.

Dangers of a Pungent Anaesthetic Vapour.

Chloroform vapour is usually, but wrongly, thought to be much blander than ether vapour. This is chiefly due to its being used in such low concentration as compared to ether. Ether will not redden or blister the skin, but chloroform will. In an equal concentration chloroform vapour is far more of an irritant than ether vapour. It has three atoms of chlorine united to its anaesthetic or hydrocarbon radical, and this chlorine causes it to be an irritant.

It is very apt to irritate the respiratory mucous surfaces, which respond by secreting an extremely thick glutinous mucous, far more slimy and tenacious than the secretion which you get with ether. No doubt this is a protective effort on the part of the mucous membrane.

This secretion takes place very insidiously; it is not forced upon one's notice as is the ether-secretion. There are two reasons for this: (1) The extremely slimy glutinous nature of the chloroform-secretion; (2) the gentler character of chloroform-respiration as compared to ether-respiration.

Ether: Fairly light, volatile, quickly absorbed, acts as a respiratory whip. The heavy breathing of ether churning up the more fluid ether-secretion, makes it bubble and rattle very noticeably in the airway.

Chloroform: Relatively inert. May, as we have already seen, greatly hamper respiration, and can never be compared to ether as a respiratory whip.

Thus, the quieter breathing associated with chloroform fails to displace or churn up the more sticky chloroform-secretion.

What happens? No bubblings nor rattlings in the airway warn the anaesthetist of approaching danger. He fails to notice the very gradual and insidious weakening of respiratory movements—the very gradual and insidious onset of cyanosis. When he does notice it the crisis is probably in its later stages. Even now that he sees something is seriously wrong he does not realize *exactly what is wrong.*

Breathing has been brought to a standstill by the combined action of two or more causes: (1.) Mechanical obstruction to respiration by a sticky plug of mucinous chloroform—secretion in the airway. (2.) The physical action of chloroform, which, as we have already seen, is liable to become dangerous whenever it is helped by a coexisting mechanical obstruction. (3.) Probably, in cases ending fatally, combined with the above causes there is usually a third cause—viz., reflex depression of circulation and respiration due to surgical stimulation of a sensory afferent nerve, or due to the imminence of vomiting.

Now, this state of crisis has been slowly produced, and only slowly can it be removed. It may happen, and sometimes does happen, that the heart will fail before this removal can be effected. The patient dies.

and it is thought that chloroform has paralysed the heart-muscle or respiratory centre. In the example now under consideration, at all events, such is not the case; the patient has really died of a most insidious and deceptive type of asphyxia.

The pungency of chloroform vapour tends to danger in two other ways: (1.) A sudden unexpected intake of a too concentrated vapour may overstimulate the sensory terminals of the vagi in the larynx and reflexly stop the heart. Such a catastrophe would be especially likely to occur in panic-stricken patients with nervous systems ablaze, with reflexes strung far above concert pitch, and ready to act explosively on any provocation. Embly maintains, however, that the action of chloroform is on the vagal *centres*, to which it is borne by the blood-stream, rather than peripheral. (2.) A too powerful vapour may cause spasm of the glottis, sometimes dangerously persistent.

Chloroform is liable to be impure through decomposition. Does this fact make for danger? Yes, it does. Impure chloroform is weaker anaesthetically than pure chloroform; you have, let us say, to use A+B of impure chloroform to get the effect produced by A of pure chloroform. Now, the more (within limits) anaesthetic you drop on to your mask, the more do you substitute anaesthetic vapour for air in the atmosphere breathed.

When using weak chloroform you may have to give so much of it to attain anaesthesia that the patient is starved of air. Straightway the pulmonary arterioles begin to close. This denial of air to the lungs which an excess of anaesthetic vapour causes is called the *negative action of that vapour.* Weak chloroform, then, tends to unduly exaggerate the negative action of chloroform—tends to cause narrowing of the pulmonary arterioles.

Narrowed pulmonary arterioles are a great danger in chloroform. Why so? They are an obstacle to recovery from the various crises which may occur during chloroform-administration. Safety in such crises lies in being able to secure an efficient circulation of blood through the lungs. If previous to the onset of crises the pulmonary circulation is already hampered, it is obvious that the crisis becomes thereby more serious, and recovery will be delayed. To take one example: A sensory nerve is stongly stimulated—say, in the region of the gall-bladder. Splanchnic vaso-dilatation occurs. The heart, having no blood to contract on, becomes automatically reduced in action. The blood, which has been displaced into the splanchnic area, to get back to the system must pass through the pulmonary circulation. It gets very little help on from the heart, since the heart is automatically reduced in action. The patient is placed, head down, on an incline, and the airway is kept normally patent so that air can get freely to the alveoli. Gravity drives the displaced blood on through portal system, &c., to the pulmonary artery. Finding the pulmonary arterioles open, the blood passes on freely through the lungs to the left heart, and the heart thereupon quickly resumes its normal action.

Suppose, now, a pre-existing spasm of pulmonary arterioles. The blood on its way back to the left heart is stopped by this. You have a reduced heart trying to overcome an obstructed pulmonary circulation. It obviously cannot do it. Immediate artificial respiration and a patent airway become urgently necessary. Till the pulmonary alveoli become flooded with air the obstacle will not begin to yield, and even then it yields gradually. It is none too easy to flood the lungs with air in such a case, because the airway is already filled with a dense inert chloroform vapour, and it takes time to get rid of this. It is obvious now how dangerous is spasm of the pulmonary arterioles during choloroform-anaesthesia. It may cause such delay that recovery becomes impossible.

Now, the anaesthetist is not clairvoyant; he cannot see the contractions of arterioles, nor can he see the pulmonary artery, right ventricle, and auricle, all distended by back pressure. When the back pressure has reached the right auricle it extends backward farther into superior vena cava .(chiefly) and inferior vena cava (to a less degree). Their tributaries begin to swell, *and this swelling he can plainly see* in the frontal and auricular veins. Such visible warning is valuable, but comes somewhat late in the vicious cycle of events just described. Nature is kind, and gives the anaesthetist a far timelier warning than veinous distention—viz., *discoloration of the arterial blood.* The moment aeration becomes insufficient (however slight the degree of inefficiency) that very moment the arterial blood darkens, though the degree of colour-change may be very slight where defective aeration is also slight. Nature has given the anaesthetist all he needs; the danger (closing of pulmonary arterioles) and the warning (discoloration of arterial blood) are practically synchronous.

It is clear, then, how *all-important* it is to watch closely the colour of the arterial blood—to train oneself to detect *the very slightest* changes in it. The ear is the best place, usually, in which to observe such colour-changes.

Let us now turn to *man*—the personal equation, more especially *airway* and *blood.*

Preliminary Examination.

Individuals differ very much in temperament and in bodily structure, and such differences have far-reaching effects upon the course of anaesthesia. To successfully give chloroform you must make first a swift but searching examination of each patient. You must be able to analyse correctly your findings, to estimate the probable danger or difficulty likely to be caused by any given variation from the normal. Having made a correct estimation, you are in a position to devise modifications of the routine method—modifications designed to obviate the difficulties present in any individual case—designed to attain and maintain a safe smooth anaesthesia.

Let us consider airway and blood, the two first and most intimate points of contact between chloroform and the human body.

Airway.—We have already set forth the physical action of chloroform in the airway hindering respiration, and we have asserted that any mechanical obstruction in the airway tends to exaggerate such physical action. We have spoken of the dangers of the glutinous chloroform-secretion. It is obvious, then, that we must look carefully for any mechanical obstruction in the airway—*e.g.*, nasal obstruction, large tongue, large tonsils, &c. We must look, indeed, for any signs of weakness or stiffness or respiratory movement, for any poverty of air-entry. We must examine the respiratory machine as a whole, not only airway but motor-power (muscles) and lungs.

We must likewise find out the degree of salivation in each case. If it appear excessive, or if the oral cavity appear congested and inflamed, we shall be especially on the alert for signs of danger from chloroform-secretion, and we shall take steps to obviate such secretion.

Blood is the body-tissue upon which I believe chloroform exerts its direct chemical action. It attacks the red blood-corpuscles, and probably impairs their function as oxygen-carriers. Anaesthesia is thus an indirect result of chloroform, due to oxygen-starvation. It follows that a correct estimate of the quantity and quality of the blood in each case is a matter of fundamental importance. From it more than from anything else is calculated the correct dosage for each case. Any one who attempts to give an anaemic girl the same dosage as a full-blooded man, say, is courting disaster.

Good red blood in plenty takes up large quantities of oxygen. Such blood has high resisting-powers, and needs much chloroform to cripple it in its function of carrying oxygen to the tissues.

Scanty anaemic blood can only take up small quantities of oxygen, and the red cells of anaemic blood offer little resistance to chloroform's attack. If, then, you present too much chloroform to it such blood quickly becomes profoundly deoxidized, the pulmonary arterioles close, and an unsafe strain is put upon weak flabby respiratory muscles and upon a weak flabby heart. I am inclined to think, though it is mere conjecture, that there may be a further danger in the case of anaemic people.

Ordinarily, if excess of chloroform be given, the blood automatically protects the body from being poisoned by such excess. It effects this by causing strong spasm of the pulmonary arterioles, thus preventing the chloroformized blood from getting into the systemic circulation in excess.

It is well known that anaemia is associated with extreme poverty of muscular tone. Take, for example, the feeble heart-sounds in anaemia. It is a fact that the muscle phenomena of asphyxia in anaemia are very, very feeble—sometimes barely noticeable. It may be, then, that the spasm of pulmonary arterioles in anaemic people may be weak and incomplete, or in extreme cases pretty well absent. If such be the case, then their automatic protective action against a toxic blood would be weak and incomplete.

Naked chloroform—that is, chloroform not linked to the red cells—would then pass through to the systemic circulation, and would exert its usual action as a protoplasmic poison. This, as I say, is mere conjecture, but it is conceivable and therefore possible.

Chloroform present in the arterial blood to an anaesthetic degree is associated with the normal red colour, or even with an increase of colour—a hyper-red colour of arterial blood.

Chloroform present in excess always darkens the blood. It follows that, above all, the patient's colour must be watched and must be kept hyper-red.

Another important point in connection with the blood must be remembered. *The dosage of chloroform depends on the quantity of blood in the systemic circulation at any one particular time,* not on the total quantity of blood in the body. Now, it may happen that a full-blooded man, getting a large dosage, suddenly becomes pale through surgical stimulation of a sympathetic nerve. Much of his blood is depleted into the splanchnic area, and his heart-action becomes automatically reduced. It becomes necessary to greatly lessen the dosage of chloroform given to him, and to keep it reduced till the circulation returns to the normal, when the original dosage may be resumed. Neglect of such precaution may lead to dangerous crises.

Yet one more point in connection with the blood must be noted. Blood offers a resistance to chloroform's attack. This resistance is great at first, but gradually and steadily lessens as the administration proceeds. It follows that the chloroform dosage must in like manner be progressively and systematically lessened from time to time.

One last point of importance before we leave the blood : Chloroform is known to be especially dangerous in toxaemias, such as diabetes, septicaemias, and renal inefficiency. Why is this? Probably it is because in these conditions the blood is already flooded with toxins, and the red cells are already fully engaged oxidizing and destroying the toxins of the blood (oxygen is known to be a great destroyer of toxins ; hence the cleansing properties of Condy's fluid, to take one example).

In toxaemias you usually get a darkening of the blood, together with incomplete or complete unconsciousness (delirium or drowsiness and profound coma), which states find a ready parallel in incomplete or complete chloroform—unconsciousness.

If now you add chloroform to an already poison-laden blood one of two things must surely happen—either chloroform has a greater affinity for the red cells than have the bacterial renal or diabetic toxins, in which case the latter will pass on unoxidized and poison the system. A second possibility is that the original toxins have a greater affinity for the blood than has chloroform, in which case "naked" unlinked chloroform—that is to say, $ChCl_3$—not combined chemically with the red cells, will pass on into the systemic circulation (a protoplasmic poison) and poison the system. In either case it is clear that chloroform and circulating toxins act as adjuvants, each of them lowering the resistance of the red cells and impairing their protective action.

Several other points in the personal equation should be carefully considered, for example: (1.) The circulatory system as a whole. (2.) The nervous system as a whole, the temperament of the patient, the dangers of excessive fear, the likelihood of excessive or unduly persisting reflex action ; the possibility of excessive weakness or sluggishness of the vital nervous centres, associated sometimes with exceptionally slow pulse and respiration. (3.) The muscular system as a whole, both striped and unstriped musculature ; the power and endurance of the respiratory muscles—blood-pressure, which is fitly considered under unstriped muscle-tone and cardiac tone. (4.) Metabolism and the nutrition of the body as a whole. Indications of defective nutrition or defective metabolism should be carefully noted, such as eczema, gout, any rough skin, hives, bilious attacks and sick headaches, muscular rheumatism, &c. Inquiry should be made as to previous anaesthetics, and the amount and persistence of vomiting after them.

Time forbids me to do more than merely mention these items in the preliminary examination ; they have been dealt with in detail in previous papers.

Synthesis.

Having completed our analysis we are in a position to construct, step by step, a safe and sound method of administering chloroform. Such a method must, above all things, be elastic and adjustable, so that the complications caused by individual peculiarities of structure or temperament may be avoided or overcome.

Let us construct in the same order as we have analysed, and start with chloroform.

Impure or Sub-standard Chloroform.

Get your chloroform in small bottles, 2–4 oz., and see that it is in coloured bottles. Keep it in a *cool dark spot*, firmly stoppered, and never expose it to heat or sunlight, nor leave it unstoppered for more than a few seconds at a time. The advantage of a small bottle is that it is finished at one sitting probably, and so is not kept for many weeks or months half-filled, tending to decomposition.

Get the very best chloroform. In dealing with a drug so dangerously powerful as chloroform "the best or nothing" should be one's motto. It is possible, after considerable practice and experience, to "spot" impure chloroform by the smell alone—pouring a few drops on one's hand and smelling it.

Physical Action of Chloroform.

This can be avoided by very gradually and very evenly increasing the chloroform dosage. By so doing you very gradually and very evenly increase the air-shortage. The respiratory machine responds to the stimulus of less air, provided that stimulus be a gradually and evenly increasing one. Should the increase be made too abruptly, then, as we have seen, pulmonary "arteriole spasm" and an inert mass of chloroform vapour together bring respiration to a standstill.

Responding to a gently progressive stimulus, breathing becomes progressively faster, deeper, more vigorous—able to keep an ever-increasing chloroform dosage in free circulation into and out of the airway.

Should mechanical obstruction or emphysema be present, or any other condition causing weak air-entry, then the chloroform will have to be pushed still more gradually (the degree of gradation being proportional to the degree of abnormality present). As additional precautions, free oral breathing should be secured by insertion of a mouth-prop ; the tongue should be kept in its normal position, and the base of the jaw not allowed to sag back.

Hewitt's oral airway and Longhurst's tongue-depressor are both very useful in this connection. A little ether may be given also to whip up respiration. Great care must be taken as to the correct "lie" of the patient on the table, nothing in it being allowed to hamper free respiration—*e.g.*, the patient's chest not being "splinted" by means of her arms pressed close to her side, bent at the elbows, hands and forearms crossed on the breast ; or, again, in the lithotomy position extreme flexion of thighs on abdomen, in a fat patient, not being allowed, since it may make respiration impossible.

Negative Action of Chloroform.

Like the physical action, this is counteracted by increased vigour and frequency of respiration. A point, however, may be reached where this counteraction becomes insufficient, and deficient aeration makes its appearance. This is especially liable to occur in very full-blooded people and in alcoholics and drug-takers, all of whom need a very large dosage. Of course, in these conditions it is often wiser not to induce with chloroform at all. It occurs, too, sometimes when weak chloroform is being used. The measures mentioned in connection with physical action help here too. A preliminary injection of morphia or omnopon may be useful, so that the patient is already on the way to anaesthesia when he mounts the table. Test your chloroform, and make certain that it is of standard strength. Preliminary depletion (to be spoken of later) is good treatment for this complication. In extreme cases it may be necessary to allow a certain amount of cyanosis during the induction.

Less chloroform is needed for maintenance, and the surgeon should not be allowed to start till the normal colour of the arterial blood has been resumed, as the combination of chloroform, pulmonary arteriole-spasm, and surgical stimulation is such an extremely dangerous one. If some degree of cyanosis is a necessity let it be with ether, and never with chloroform whilst surgical stimulation is going on.

The Glutinous Chloroform-secretion.

This can be avoided in two ways,—

(1.) Give the patient (adult) $\frac{1}{120}$–$\frac{1}{100}$ gr. of atropine at least one hour before induction, as a routine, only avoiding it in cases where secretion is initially unusually scanty. Examine the patient's oral cavity just before induction, and if secretion still be free give a gargle of alum or Condy's fluid, fairly strong. Where exceptionally free secretion is met with, the anaesthetist will be on the alert throughout the administration for the first warnings of danger from it. He will watch for swallowing during the induction, for weakening respiratory movements, and for the slightest indication of commencing cyanosis. He may periodically pass a sponge through the fauces, and mop round the glottis, and notice the amount and character of any resulting secretion on the swab, and whether any change in breathing or colour follow.

It must be remembered that atropine will probably have the effect of paralysing, or at any rate weakening, the contraction of the pulmonary arteriole's muscular coat, so that—(*a*) Their protective action against a blood overdose of choloroform reaching the systemic circulation is lessened ; (*b*) on the other hand, any vagal action is obviated ; (*c*) sudden dangerous complete spasm blocking the pulmonary circulation (such as I believe you occasionally get with an abrupt overdose of ethyl chloride) is likewise obviated.

(2.) Increase the choloroform dosage during induction *extremely gradually, especially for the first two or three minutes.* After a time the airway becomes less sensitive to irritation, and the rate of increase of chloroform may be quickened. Probably the local action of the chloroform vapour deadens the mucous lining to some extent after a time, or else a thin coating of glutinous secretion protects.

The respiration must be watched very closely, for the dosage of chloroform depends upon it once the induction is complete.

Weak breathing during induction means a slow induction, and must not be allowed to continue, since it hinders access of chloroform to the blood. Once the blood is thoroughly under the influence of chloroform it is a matter of circumstance whether or not weak breathing should be allowed. To any one who is not thoroughly expert—thoroughly master of the situation, I should say—" Never under any circumstances permit weak breathing to continue, as it is undoubtedly a potential danger. So long as you maintain efficient respiration, with the normal complexion, you need have little fear. If under such circumstances crisis should occur, it is almost certain that chloroform has nothing to do with it, and with appropriate treatment the patient is bound to recover."

An expert, on the other hand, may find it very convenient to allow feeble breathing, or even to provoke it. The blood being once fully chloroformized, feeble breathing simply means a condition *approaching* chloroform equilibrium. *Complete* chloroform equilibrium may now be secured by periodically adding a drop or two of chloroform, thus making good to the blood periodically the very slight chloroform-loss occasioned by feeble breathing.

The simile of a vessel of water with a hole in it illustrates my meaning aptly. With a large hole the vessel quickly fills and quickly empties. With a small hole it slowly fills and slowly empties, and a little leakage is easily made good.

When this trance-like anaesthesia is typically present the patient keeps a perfect colour, breathing-movements are so slight as to be only just perceptible, and the condition is obviously one of perfect restfulness (the "dewy sleep of infancy" you might almost call it). You are most unlikely to be able to attain such an ideal in, say, a severe abdominal operation with extreme visceral and peritoneal stimulation, but it is admirably suited for plastic operations where a couple of hours, say, are to be spent in repairing a scarred cervix and badly torn perineum. I have several times attained it, too, in Alexander's operation, though here the traction on the round ligament momentarily upsets it. It is obviously a valuable state to the expert anaesthetist, because a tedious two-hours operation becomes under this trance-anaesthesia less tiring than a ten-minutes operation under ordinary anaesthesia. How is this state produced ? I do not know exactly, but it is probably a complex state, whose components are—(1) A moderate degree of physical action of chloroform ; (2) a moderate degree of glutinous chloroform-secretion ; (3) slight displacement backwards of the base of the tongue ; (4) a non-excessive degree of surgical stimulation.

"Trance-anaesthesia," if I may so christen it, has another manifest advantage for all "habitues" of operation-theatres. Far less chloroform diffuses into the theatre atmosphere ; those who are constantly giving chloroform realize how it upsets them.

To Revert to the Blood.

Consider carefully its quantity and quality, and adjust your dosage accordingly.

In extremely full-blooded people it may be desirable either to deplete by purges and moderation in diet some days before administration, or to deplete locally immediately before operation. The latter object may be attained in several ways : (1.) Position—Raising the head and shoulders and lowering the legs ; or keeping the whole body, head raised, upon an inclined plane. (2.) Drawing the blood to the feet by means of a foot-bath of mustard and hot water. The blood once drawn to the feet may be kept from returning to the main circulation by bandaging sufficiently tightly to prevent venous return. This is practised, I believe, on the Continent by certain surgeons.

Theoretically it has another advantage, which is this: The blood so shut off does not come into contact with chloroform till it is returned to the main circulation at the end of an operation by loosening the bandages. Thus during the period of recovery the body is flooded with a quantity of unchloroformized blood. This blood, though stagnating during the operation, quickly returns to the normal on passing through the pulmonary circulation. Once having regained the normal, this blood is able to quickly and efficiently reoxidize the body, and thus brings about a rapid and efficient recovery. I have no personal experience of this method, but its advocates praise it. To me it is of doubtful advantage, except in exceptional cases. It cannot be a very good thing to keep a considerable portion of the body's blood stagnating for an hour or two. I should have thought that stagnated blood might become more injured than lightly chloroformized blood. Certainly, however, it would be advantageous from the point of view of promoting a smooth induction in certain extremely full-blooded patients.

Dr. Hornabrook, of Melbourne, first pointed out to me the advantages of raising the head during induction. There is less blood in the cerebral circulation, and consequently less excitement; and less anaesthetic is needed to induce, consequently there is less risk of a blood-overdose. Needless to say, in anaemic patients you would not raise the head.

Anaemia is a more dangerous condition anaesthetically than is full-bloodedness. Its chief dangers we have mentioned already, but apart from them anaemia means malnutrition, and malnutrition means body-tissues less able to meet and allow for any adverse circumstance. Apart from the blood-danger, an ill-nourished brain and weak ill-fed musculature (heart, blood-vessels, and respiratory muscles) may readily fail their owner in a moment of crisis.

Another thing which makes anaemia dangerous is that changes in the colour of the arterial blood are so hard to discern. Choose some organ like the tongue, where arterial colour-change is plainest to the eye, and watch it most carefully. Venous distension is not masked in anaemia, and consequently becomes exceptionally valuable as a sign of danger. Watch the temporal veins, and also the small veins on the pinna of the ear. These small veins are of the utmost value to the anaesthetist for "spotting" venous distension in its earliest stages, and venous distension with chloroform spells danger.

As we have already said, muscle-phenomena in anaemic patients are very feeble, and do not give you much warning; but if you notice slight "epileptiform" twitchings of the fingers in an unconscious anaemic patient, stop giving the anaesthetic; do not push it, thinking you are dealing with light anaesthesia. These twitchings signify imminent crisis. Sallow people and coloured races provide the same difficulty as anaemics. You must choose an accessible mucous membrane in which to watch for colour-changes in the arterial blood. To any but an expert I should certainly say open ether is far safer than chloroform for the anaemic.

Another thing the anaesthetist has to consider is haemorrhage. Remember that bleeding very greatly hampers the surgeon in his work, and is probably the chief cause of shock. The anaesthetist is quite as responsible for bleeding as is the surgeon.

Wherever there is the least cyanosis and venous distension, there you will get excessive bleeding, and often you can greatly check bleeding and help your surgeon by changing from ether to chloroform, though be careful how you do it, as such changes are apt to be rather "tricky." I fancy the change from chloroform to ether is a more dangerous change than from ether to chloroform.

Another reason why you should carefully watch the amount of bleeding is that you must be guided by it to judiciously lower your dosage of chloroform. The pulse does not show the effect of moderate bleeding immediately, but after a short interval, and in such bleeding you must adjust your dosage to the near future of the pulse rather than to its actual present.

In fever cases and toxaemias give ether as lightly as possible, or if giving chloroform give oxygen both before it and with it, to get the blood into as healthy a condition as possible.

The end word with regard to the blood is this: "*Watch like a hawk the colour of the arterial blood, and watch equally carefully for the earliest sign of venous distension. This intense concentration of the anaesthetist upon the veins and upon the colour of the arterial blood enables him to detect the very earliest signs of distension and darkening (which mean pulmonary arteriole-spasm, and are synonymous with danger and with unnecessary exhaustion of the patient's reserve fund of vitality), and is far and away the most important thing in the whole range of anaesthetic practice—far more important even than watching the respiration.*

The blood is the direct seat of chloroform's chemical action, and is therefore the prime object for prophylactic observation.

Space forbids me to dwell on the many other interesting points raised in our analysis.

One thing must be mentioned—fear. Avoid it by every means in your power. Tact can do wonders, but some cases need to be stupefied before induction. Fear lowers blood-pressure dangerously, tunes vagus and sympathetic centres far above concert pitch, exaggerates reflexes and makes them unduly persistent, tends to vomiting, and so excites the cerebral centres that much more anaesthetic than usual is needed to overcome them. Fear is always most upsetting; it is sometimes highly dangerous.

We have constructed now the broad principles of a safe and sound method for administering chloroform. Space forbids that I should consider such a method in detail here.

In conclusion, I should like to say that nearly all the ideas in this paper have been either taken from or suggested by Mr. Richard Gill's great classic, "The $CHCl_3$ Problem," a close study of which is most desirable for any one who seeks thoroughly to master the theory and practice of anaesthesia.

NOTE.—For evidence in favour of the facts regarding spasm of pulmonary arterioles, and consequent stoppage of the pulmonary circulation, refer to—(1.) "Circulation and Respiration," first series, Sir Lauder Brunton, pp. 331–333. (2.) B.M.J., 1894, April 21, p. 841 *et seq.*: "The Influence of the Arterioles," &c., by Sir George Johnson, M.D., F.R.S. (3.) The "Asclepiad," vol. ii, Sir Benjamin Ward Richardson.

TREATMENT OF HYSTERIA BY PSYCHO-ANALYSIS: BREAKING THE RESISTANCES.

By Stuart Moore, B.A., M.D. (Dunedin, N.Z.).

At the outset I desire to say that I should much prefer to do six months' further work at this subject before reading my paper. The work which I have done in the subject is of any value as proof only in so far as it parallels exactly, as far as it goes, the findings of Freud. The treatment of some of the cases I refer to is unfinished, and in any case my results have yet to show that they will withstand the action of time. I feel justified in giving this paper, however, because the subject is not only unpopular, but of wide-reaching importance. The utility of Freud's methods is proved, but not appreciated widely. I have practised other methods of psychotherapy—hypnotism, re-education of attentive control, &c.—with success, but I am not a spiritist or a mystic. I am not at all a student of the occult. I study psychology in the same spirit and with the same objects as I study diseases of the heart. I regard it as a branch of physiology and pathology.

A woman has a drunken husband who is sent to gaol for indecency. She wishes him dead. On coming out of gaol the husband develops pneumonia, and nearly dies. My patient reproaches herself bitterly, and determines no more to entertain this wish of hers. The wish, however, is strongly charged with emotion. This emotion is further re-enforced by the fact that in infancy my patient entertained a similar wish relative to a drunken father. She endeavours to destroy the wish by re-enforcing the opposite idea—by rushing to the other extreme. She fails in her intention, for, though she becomes unaware of the wish, it is not destroyed, but merely pressed into the unconscious. There it, being fully charged with emotion, constantly struggles to get into consciousness, and can only be put down by a constant re-enforcement of the opposite idea—by obsessive worrying lest something happen to her husband. Her obsessive thinking, like many hysterical symptoms, is a defence against an unbearable idea. By means of the symptom the patient hides from herself the truth. The hysteric, then, unconsciously prefers the symptoms which trouble her to a consciousness of the causative idea, and resists, with great unconscious determination, the discovery, even to herself, of the hidden parts of her mind. For the purposes of treatment a full and free confession is necessary. The first problem in treatment is to overcome the resistance of the patient. In this simple case a knowledge of Freud's psychology enabled me easily to translate the patient's symptom into the underlying idea, to obtain confession, and to cure her of her worry in fifteen minutes.

The physician, then, must have a knowledge of Freud's psychology. He must be able to make, through this knowledge, shrewd guesses as to the unconscious ideas underlying symptoms. It might be thought that there was danger of a wrong guess falsifying the patient's memory. A little practical experience will soon convince any one that he can confirm Freud in saying that there is no such danger. If the guess is wrong, and the patient is treated reasonably, he is by that guess stimulated to find out the real solution of the problem. He will not accept the false idea. The physician must have a knowledge of the sort of ideas that underlie the symptoms of hysteria and obsessions. He must be acquainted with the varied and ingenious mechanisms by which the hysteric conceals from herself her unconscious and unbearable ideas. I shall first say a little about some of the simpler of these mechanisms.

In the simple case I have just reported to you there is an illustration of one of the most common of these mechanisms—rushing to the other extreme, or strongly re-enforcing the opposite idea. My patient worried lest her husband should die, in order to hide from herself her wish that he would. The frequency with which we meet this mechanism in hysteria is not to be wondered at, for, as Münsterberg points out, there is evident throughout, in the action of our mind-brains, a mechanism of antagonism. Instinctively we recognize this, and normal people both consciously and unconsciously play on it. We suspect the prude of secret delight in lascivious thoughts or actions. We distrust the man who talks religion in business hours. If I am jealous of my neighbour I may be able to overcome that feeling by deliberately acting generously towards him. One of my patients has an unconscious desire to exhibit. She takes particular care that she is covered—all buttons and fastenings must be fixed at least twice, counted, and reinspected. Frequently we find that, so strongly is the unconscious unbearable wish charged with emotion, the subject makes a compromise. Instead of re-enforcing the idea which is the true opposite of her unbearable wish, she makes believe to herself that she is doing so by re-enforcing an idea that might easily be confused with the true opposite of that wish. She may adopt many refinements of such a mechanism, which I must leave you to imagine. The result aimed at is to conceal her wish from herself, while the way is left open for its realization. Hence it is we find so often that the unconscious wish, charged with emotion, has a way, both in the normal and in the hysteric, of being realized. I am jealous of my neighbour, but deny it even to myself. Most surely I will find a chance to play him a dirty trick. Then I will try to mislead myself and the world by saying that what I have done has been done on principle—for the good of the profession, or for the glory of God. " Foolish people when they do something of which they are ashamed say that they are acting on principle."

Here is an incident I observed in everyday life: A wife is angered by her husband, and is inclined to throw a cup of tea at him. She restrains the impulse, and calls him " darling." She then sits down and spills tea, but on her own dress. The unconscious wish may be realized in full reality, or merely symbolically. In whatever way the realization is gained the hysteric takes care to retain a " guid conceit o' hersel' " by hiding from herself the motives of her acts. Thus, a girl is engaged to a man who is going abroad. One day, as the marriage-time draws near, she realizes what she has let herself in for—that she is going far away from her mother and people. She funks it, but denies her feelings to herself. She loses all interest in the marriage, is listless, and very ill from " nerves." She wants to be married still, she says; but *in the interests of her lover*, and only on that account, she thinks the marriage should be postponed. It would be unfair to marry him when she is so ill. Her trick failed, for medical men advised the marriage in the interests of her health. Had these men had a knowledge of psychology they would have been able to learn that the marriage was contra-indicated. She is married, and sails away, but droops more and more, so that on arrival at her destination she is packed off home again. Finally her husband gives up his career, and settles down close to her people. She has her way after all, but she makes shift to retain her self-respect. At times she piously regrets that her health has hindered her husband's career.

The unconscious wish is very often realized merely in symbol, just as a child's wish to ride a horse is realized by riding a broomstick, or as the wife above mentioned, who spilt the tea, partially realized her angry impulse. One of my patients, as a girl, saw a boy chase the girls while he urinated at them. My patient has an unconscious desire to have this experience repeated—to be urinated on. When she goes to draw water to wash her face she plays with the tap. She draws some water, then, in a fright, turns the tap off. In a commotion, she runs to her bedroom and fixes her suspenders. This performance is repeated more or less often until she succeeds in drawing the water, or calls some one to her aid. The tap is to her a penis; the water, urine. She is, in symbol, struggling against, yet dallying with, this perverted sexual assault. She begins to wash her face. She cannot stop for some time. She puffs and blows. This is symbolic realization of a perverted sexual act. The patient remains ignorant of its nature. She is saved from sexual perversion by a neuropsychosis. If this seems far-fetched to any one, it would seems less so were I to give the partial analysis of two boy patients of mine and describe their actions. One is a very bad masturbator; the other a persistent case of eneuresis nocturna.

The hysteric, like the normal, may realize her unconscious or conscious wishes only in dreams. Freud has shown that the dream always expresses a wish of the dreamer. The wish expressed usually is an unconscious one, and it is usually expressed in symbolic form. I have not time to give an analysis of any complicated dream drawn from my practice. The interpretation of a dream is often a considerable piece of work; but just as there are some nervous symptoms which are but a thin veil which quite fails to conceal the underlying wish from the psycho-analyst, so certain dreams are typical, and can be interpreted without further help from the patient. In the first simple case referred to in this paper the woman worried about her husband. I inquired for a typical dream. She dreamed that her husband was dead, and she was distressed on that account in the dream and on awakening. The dream, accompanied by its emotion of distress, is evidence of an unconscious wish baldly expressed. When it is dreamed it refers back to a similar wish in infancy or childhood. My patient had wished her father dead, which in childhood means that she wished he would go away for good. A word or two further on dreams: The dream is the guardian, not the disturber, of sleep. Peripheral sensations—*e.g.*, a heavy supper—may certainly cause dreams, but that explanation of dreams is partial, for it fails completely to explain the varied content of the dream. The analysis of dreams leads to the very heart of a patient's emotional life. The populace has been right. "I would not even dream of such a thing" is a common saying, which assumes that a dream is expressive of a wish.

What sort of wishes underlie the hysterical symptoms? Hysteria is admittedly a half-way house to lunacy. In lunacy sexual perversion and degradation are seen unabashed. In hysteria, the half-way house, these same things often exist, hidden by the symptoms of defence. Psycho-analysis cures certain cases of insanity. The value of this argument is perhaps open to serious question. I give it not to support

Freud's practice, which is established and does not need my help, but merely to help others to gain a general notion of his ideas. When we make a psycho-analysis of an hysteric we come first to the latest developed symptoms. These may appear to have little to do with the sexual life; but as we peel off layer after layer of painful ideas, discharge their emotion, and bring them into associated relations with the conscious ideas, we come at last to the kernel of the whole matter. If opportunity to push the analysis far enough exist, it will invariably be found, according to Freud, that there has been some abnormality in that highly specialized and exceedingly complex process, the development of the sexual emotions. Nor need this surprise us. Just as the human body develops from a single cell, and recapitulates in its development that of the species, we should expect that our emotions should develop in a gradual and orderly manner from the primitive instincts which are universal in the organic world—self-preservation and reproduction. Fundamentally, it seems to me that, according to what I have learnt from Freud, the emotions connected with these two instincts are, in the primitive form met with in infancy, closely allied, so that for practical purposes we may pretty well ignore the instinct of self-preservation. Freud traces the development of our sexual emotions—and, indeed, of other emotions—to certain components which exist in infancy and childhood. So far as I am acquainted with his writings, the possibility of tracing them still further to simple reflex action has not been mentioned by him. For all that, he comes pretty near tracing them to reflex action, but only in part.

The work of Pawlow on the creation of simple and complicated secondary reflexes, however, suggests to me that, although Pawlow himself seems to have little time for psychology, his work will ultimately be correlated to Freud's. Then we shall be able to trace the development of our emotions from reflex action. This cannot be done completely, of course, for there is the problem of consciousness to face. Such a theory of development of our emotions from reflex action would be incomplete, however. Our knowledge of the part played by the ductless glands, and of bio-chemistry, shows us that the development of our emotions must also be studied from a chemical point of view. We shall yet understand more fully than we do the manner in which ductless glands, drugs, and poisons of various kinds influence our emotional life, in normal and abnormal development.

To return to Freud: I shall do little more than state what in his opinion are in infancy the components or forerunners of the adult sexual impulse. The child is a pleasure-seeker, and in its search for pleasure has absolutely no scruple. In the course of development and by education, shame, disgust, and the normal sense, &c., arise. It is these which check the child's unscrupulousness in his search for pleasure, and make him civilized, through the development of inhibitions. We are, then, something more or less like what we pride ourselves on being, through the development of inhibitory power. Undo the process of development, weaken our power of inhibition, and the unscrupulous child reappears, or tries to do so. The hysteric lacks self-control, and endeavours to fly from the unbearable impulses which strive to rise in her. The child obtains pleasure, which may take on the intensity or quality of sexual pleasure, in many ways: first, by stimulation of its body. This stimulation is often rhythmic, as by sucking the mother's breast or its own thumb, by being rocked to sleep, or by swinging. Other stimulations—*e.g.*, by passing a constipated motion, holding the urine until it is painful and then letting go, kissing, tickling the foot, &c., may each and all be a component of the future adult sexual impulse. Associated with anal eroticism we have pleasure in filth, which may be swallowed or plastered on the body of the child. The impulses for looking and exhibitionism, the impulse to cruelty, and to obtaining pleasure by the receipt of pain are closely allied to the above. The affection which a child has for its parents and for others around, and its hatreds, act as components of the future sexual impulse. Owing to congenital defect, or to stress of environment, faults in this most complex development occur. The pleasure arising from one of these sources may be abnormally developed, or, later, insufficiently suppressed. For a time the individual may appear normal, but later a strain, such as disappointment in love, undoes the process of development and education; and the primitive sexual wishes of infancy, polymorphous, perverse as they are, strive to gain an entrance into consciousness. If they succeed we have sexual perversion. If they partially succeed we have hysteria and obessions. "Impressions from the second year of life, or even from the first, leave a lasting trace upon the temperament of persons who later become diseased, and these impressions—greatly distorted, it is true, and exaggerated by memory—are capable of furnishing the original and fundamental basis of hysterical symptoms."

Now, with a knowledge of the components of the sexual impulse and of their development, with a knowledge of the interpretation of dreams, the physician is brought face to face with a case such as one some of whose symptoms I have already referred to—the case which worries over drawing water and washing her face. This patient also frequently washes her hands quite unnecessarily. She fastens her clothes with extreme care. She dreams that a man with cancer is brought to her house and dies. She takes a fancy that she may have swallowed a needle, &c. Now, I may form my own opinion of these symptoms—make guesses as to the ideas underlying them. The washing of her hands suggests delight in filth; the fastening of her clothes, fear that they will fall down, suggests an unconscious desire for exhibitionism. Her dream about the man dying of cancer suggests an unconscious sexual desire for filth, for cancer is a loathsome disease. Her fear of swallowing needles suggests, probably, a craving for masturbation. This patient fears to put her clothes on; she was afraid something might get under them, and I may guess that that is exactly what she unconsciously desires. Making such guesses, even if they are correct, and informing the patient, will not cure her. I must lead her, in her self-analysis, to peel off, layer by layer, the painful ideas covering the fundamental faults. I must retrace the emotional development of her symptoms. My guesses give me a theory to work on, and help me in the same way, in my examination, as I am helped by asking questions of myself in a physical examination. Who has not, as a student, missed observing rigidity of the abdominal muscles or tenderness of the skin because he did not look for it? This translation of symptoms is not necessary in every case, and is often impossible at first. It is not the typical method of Freud, but may be necessary. This patient, however, has expressed the extreme opinion that it is wrong for a girl to want to get married, and thinks she is free from all sexual feeling.

How can I break through her reserve? How is it possible, without driving her away from me, to present to her Freud's theory and tell her what I think? Unless I break her resistance I can for months ask her what comes into her mind when she thinks of some word and never will I find an erotic thought. The patient must first of all be treated on the economic principle. She must be told only as much as she can stand. I usually tell the patient first that there is a fault in the development of the emotions, and only later explain that this implies sexual emotions. I tell her, later still, that she has tried to go mad, but saved herself by her symptoms. Before I tell her this last, however, I make use of the teaching she has already received in church. It is a curious fact that though Freud's theories are revolting to us when first we hear them, if we omit detail his teaching contains much that is taught in various religions, including the Christian religion. Much of his theories is merely a detailed elaboration of views promulgated by the Churches and accepted for centuries by the greatest minds and by the mass of the people. That the child is an unscrupulous pleasure-seeker is, surely, a statement very like the doctrine of original sin. "The heart of man is deceitful above all things, and desperately wicked." If we ignore the theological sense of the word "wicked," which implies sin, this is a brief statement of Freud's views. Freud teaches us the wickedness of our hearts with a vengeance. Thus, avariciousness is sometimes merely a reaction against an infantile pleasure in the anus. The process of psycho-analysis is paralleled by the religious practice of self-examination. In this the devotee, in contemplation, searches his heart for sinful desire. In psycho-analysis the physician helps the patient to search for unbearable ideas. Conviction of sin corresponds to the discovery of the unbearable ideas, and the Churches all teach that confession is good for the soul. If my jealousy of my neighbour is conscious and uncontrollable, confession may give me control of it. "Ye strain at gnats and swallow a camel" may be altered to read "Ye strain at gnats because ye swallow camels," and so the mechanism of antagonism, of rushing to the other extreme, is illustrated.

Again, my patient says that no harm can come to her by anything sexual she saw or heard as a child. Why not? Does not every decent person take care to hide from the young those things which it is not good for them to see or to hear? Of course, as physicians, we have nothing to do with religion, and we should keep to psychology; but the work that we find ready done for us by the clergy, who have taught our patients the essential truth of Freud's theories in general terms, provides too useful a lever for us not to use it. Besides, even without any profession of religion, a knowledge of the Bible puts us in the good opinion of many people. We gain with them all the advantages of the hypocrite by merely quoting from that book.

This theory of Freud elevates many hysterics in the moral plane. They often suffer from insane unconscious impulses which people who are less particular would indulge. The hysteric unconsciously prefers to be ill. On the other hand, this theory teaches the hysteric that underneath her, as under us all, lies the beast.

Much more remains to be said about breaking the patient's resistance, but I am not going to say it. I have, in a few smattering remarks, touched the fringe of the subject. I have left so many great gaps in my statement that I may easily be misunderstood. I have endeavoured to present the subject simply, and as it appears to me. I hope I have done something to break down the resistance of those who are unfamiliar with this work. Just as surgical enthusiasm ignores the smell of the rectum, so a humane aim purifies this psychology. I have that confidence in myself which emboldens me to run what risk of failure there is in this work I have chosen. If any of you will study Freud, and then study patients, you will find what he describes. What Freud says is, in the main, true.

To give an illustration of one of the simplest methods by which symptoms may be translated, take a case typical of a number I have treated, which illustrates how hysterics work on the mechanism of antagonism of our mind-brains. A young woman of thirty complains that she worries lest something should happen to her father. She cannot get rid of this thought. Her father is a drunkard. She complains of having a heaving sensation in her chest. Fixing her mind on this sensation, she recalls a time when her father came home a sickly sight, drunken and bloody, and exclaimed, "I'm done for." Since that incident she has had the heaving sensation. I make a guess to myself from the circumstances, and say, "You dreamed that he is dead?" "Yes." "You wished him dead when you were a child?" "Yes." "You felt you would be glad if he were 'done for' when he said so?" "Yes." "The reason you worry lest something should happen your father is because you wish he would get killed, and are ashamed of the wish." Then followed a full confession, and the symptoms disappeared. Here, thinking of the mechanism of antagonism, I translated the symptom of worry. The hysterical symptom, arising as it did, enforced my suspicion. The fact that she dreamed of her father's death confirmed my view, and enabled me to know that she had, as a child, wished her father dead or out of the way. Next week she came to me complaining that she was wishing all the time that she could do something for her mother, and for a friend who suffered from nerves. I suggested that her patience with these people was exhausted, and that she felt herself put upon. This proved correct, and these symptoms disappeared. This patient had a hysterical symptom—the heave in the chest. She therefore had hysteria. She also had symptoms of anxiety neurosis, which I have not detailed. The immediate underlying cause of her condition is this: She is the second-eldest daughter, and has so far obeyed her mother's behest and sacrificed herself for her family. She has passed many chances of marriage, but is now at an age when she feels that she must give up all thought of marriage for good and stick to her family, or get married and leave them. To leave them, she is always being told, would be selfish. Treatment consists in advising her what to do—in this case, to get married, and shift the family burden on to her younger sisters. My result in this case, as in all my other ones, has yet to stand the test of time.

I thank you for your patient attention.

EXOPHTHALMIC GOITRE.

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I have recently reported sixteen cases of exophthalmic goitre treated with the X-rays. I have also had two fatal cases of Addison's disease, and a third one diagnosed as such, but which recovered.

No.	Sex.	Age.	Thyroid.	Pulse.	Exophthalmos.	Tremors.	Skin.	After Treatment.
1	F.	44	Large ..	118	Slight ..	Present ..	Sallow ..	Pulse 98.
2	F.	40	,, ..	100	,, ..	,, ..	Dark ..	,, 90.
3	F.	20	Very large ..	120	Prominent ..	,, ..	,, ..	Gained 22 lb.
4	F.	50	Large ..	120	,, ..	,, ..	Sallow ..	Pulse 78.
5	F.	56	,, ..	120	,, ..	,, ..	Very dark ..	,, 84.
6	F.	40	,, ..	110	Slight ..	,, ..	Yellow ..	,, 80.
7	F.	60	Very large ..	120	,, ..	,, ..	Very dark ..	,, 80.
8	F.	35	Large ..	140	Prominent ..	,, ..	Dark ..	,, 84.
9	F.	30	,, ..	100	,, ..	,, ..	,, ..	,, 80.
10	F.	45	,, ..	100	,, ..	,, ..	,, ..	,, 80.
11	F.	52	Very large ..	130	,, ..	,, ..	Pigmented ..	,, 82.
12	F.	33	Large ..	100	,, ..	,, ..	Very dark ..	,, 80.
13	F.	56	,, ..	90	Slight ..	,, ..	,, ..	,, 76.
14	F.	28	,, ..	110	,, ..	,, ..	Pigmented ..	,, 90.
15	M.	38	Very large ..	132	Very large ..	,, ..	,, ..	Gained 13 lb.
16	M.	44	Slight ..	110	Slight ..	,, ..	Very dark ..	Pulse 80.

The Age of the Patients.—The average age was forty-five years, only two patients being under thirty.

Sex.—Fourteen out of the sixteen were females.

History.—In every case a definite history of severe mental strain was given. Both male cases adduced business worries as the cause of their illness. One female stated that her eyes became prominent after a long course of study for an examination. One gave domestic worry and thirteen confinements as the origin of her symptoms. Seven cases were passing through their menopause.

Cardiac Symptoms.—In all cases palpitations, runaway heart, throbbing headaches, and in late cases some distinct valvular trouble were present. Severe epistaxis occurred in one patient.

Nervous Symptoms.—Tremors of fingers or face, an indescribable feeling of fear, sleeplessness, and extreme fatigue on the least exertion were common to all the patients. In many cases patients complained of coldness, or numbness of the fingers and feet.

Digestive.—Diarrhoea or obstinate constipation were noted. One patient had recurring attacks of vomiting, which lasted for days.

Loss of weight was noted in each case—in three it was extreme.

Complexion.—I noted in each patient the condition of the complexion. It was always darkened. One patient consulted me for this alone, a definite area of pigmentation having appeared round the temples.

The Effect of the Treatment.

Each patient received the same dosage. The skin of the neck was protected with boiler-felt, and in no case did I find any bronzing occur. The first effect was the reduction of the pulse-rate. This was rapid. In one case it fell from 120 to 80 after seven exposures, from 132 to 98 after nine treatments, from 120 to 78 after eight exposures, from 136 to 88 after fourteen exposures. In two patients where definite lesions of the heart existed, a distinct improvement followed the treatment.

The nervousness improved from the first exposure. Three patients were escorted by friends for the first few exposures, being extremely hysterical. Later these patients attended alone.

The sense of fatigue diminished quickly. Several patients who had to drive to my house for the first few treatments came later on foot. One patient who was too fatigued to walk even a few hundred yards reported to me later that she was now able to play tennis. The tremors in each case subsided almost completely.

In the case where vomiting had been a symptom, this ceased after the second exposure. The case which had suffered from attacks of epistaxis reported that she had not been troubled again since the first treatment. One case which had suffered from attacks of diarrhoea had no return of this symptom during the treatment.

Increase of Weight.—Treatment by thyroid extract has been successful in reducing the body-weight; in fact, one patent fat-reducer contains this extract. It is not unreasonable to expect that the absorption of excess of thyroid-secretion would cause a reduction in the patient's weight. In each of my cases the weight increased. One patient increased from 8 st. 10 lb. to 10 st. 7 lb.; another from 8 st. 5 lb. to 9 st. 10 lb.; and a third from 9 st. to 9 st. 13 lb.

Complexion.—The effect of the rays upon the complexion was very striking. As I have mentioned, in every case the complexion had darkened, and varied from sallow to very dark. In each case this change was reversed, and the complexion assumed a lighter tint. One patient has become rosy after some months of treatment once a week.

Size of Thyroid.—I have always been able to reduce the simple enlarged thyroid with X-ray exposures, but in the case of exophthalmic goitres I have never obtained any reduction greater than 1½ in. This is very small in contrast to the reduction of simple goitres.

Exophthalmos.—In only one case could I positively say that this was markedly reduced.

In contrast with the exophthalmic cases I have notes of three cases of Addison's disease, two of which proved fatal. The third was diagnosed by three experienced physicians, but apparently was not true Addison's disease.

(1.) Male, aged forty-four: He began to notice that he was fatigued very easily, and was unable to concentrate his mind on his work. The speech was hesitating. The skin of the face and chest became very dark. The pulse became extremely rapid and irregular. The bowels were constipated, and he had attacks of vomiting. In a few months the skin became so bronzed that he resembled a Maori. He had two epileptiform fits, and died unconscious.

(2.) Female, aged forty-eight: She gave a history of wasting and great fatigue for several months. When first seen she was extremely nervous, and very emaciated. The complexion was very dark. The hair was scanty. In a few weeks she became too weak to sit up. The scalp became almost bald. The complexion darkened to a deep bronze. Vomiting was almost constant. The pulse was rapid, but very small. Her chief complaint was a continuous ringing in the ears. She died a few months after I first saw her.

(3.) Female, aged forty-two: First consulted me for fatigue after work. She had always been very active, but recently felt unable to do any work. She had fainting attacks, and lost her memory for some weeks. The skin became very bronzed. The weakness was so great that she was practically unable to move. The breath was extraordinarily fetid. After several weeks she slowly improved. The complexion regained its normal colour, and she is now in good health.

I think it may be fairly suggested that both Addison's disease and exophthalmic goitre show certain symptoms in common. I refer to the cardiac disturbances, the irritation of the digestive apparatus, the typical asthenia seen in both cases, and to the distinct alteration in the colour of the skin, so marked in Addison's disease and less marked in exophthalmic cases.

I cannot help believing that both these diseases are due to a primary disease of the sympathetic nervous system. For this belief I venture to offer the following reasons:—

Dr. Kinnier Wilson, in a recent lecture, pointed out that the sympathetic nerve-supply consisted of two distinct systems—the vertebral system and the parasympathetic or autonomic system—and stated that there is evidence that these two supplies are mutually antagonistic, referring as an example to the sympathetic supply of the sphincter iridis: "The autonomic system has three centres—the mesencephalic, the bulbar, and the sacral. From the first of these pass autonomic fibres by the oculo-motor nerve and the ciliary ganglion to the sphincter iridis, constricting the pupil in their action. The corresponding vertebral sympathetic supply, antagonistic in its function, is constituted by pupil-dilating fibres from the cervical sympathetic in the neck, reaching the eye by a circuitous route via the carotid plexus and the superior division of the fifth nerve."

With regard to the cardiac supply, the autonomic nerves are supplied by the vagus, and the vertebral sympathetic nerves arise from the visceral plexuses, cardio-inhibitory nerves being found in the vagus and accelerating nerves in the sympathetic system.

This double sympathetic nerve-supply is distributed to the skin, glands, vessels, respiratory and digestive systems, and its mutual antagonism may furnish an explanation of many puzzling symptoms.

Granted this antagonistic action or nerve-balance, it is interesting to examine the chemistry of the two ductless glands in question—the thyroid and the suprarenals. From the thyroid gland two distinct physiological substances have been extracted—a nucleo-protein and a nucleo-globulin—and these are antagonistic in their action. An injection of a dose of nucleo-protein produces high blood-pressure, nervousness, insomnia, &c., while an injection of nucleo-globulin produces opposite effects. It is unreasonable to suggest that in normal health the sympathetic nerve-supply of the thyroid gland being in a state of balance, neither of these substances are secreted in excess, but that when the balance is disturbed by ill health or mental excitement one or other substance is secreted in excess, in response to the action of the preponderating section of the nerve-balance.

Adrenin, the hormone of the suprarenals, is formed in the medullary part of the gland. This portion (which contains the chromaffin cells) is derived from the sympathetic system, in contradistinction to the cortical portion, which is developed with the upper part of the wolffian body. These chromaffin cells are found scattered about the sympathetic system; so we may conclude that if the disease known as Addison's is due to disease of these cells, Addison's symptoms may occur without actual disease of the suprarenals themselves; and it is undoubted that Addison's symptoms occur in cases where no disease of the suprarenals are found.

An injection of adrenin produces contraction of the arterioles, a rise of blood-pressure, an increase in the contractile power of both voluntary and involuntary muscles. A deficient supply of this hormone should logically result in the opposite symptoms—a low blood-pressure, muscular weakness, and heart-feebleness. Granted that these chromaffin cells are the actual producers of this tonic (adrenin), it would appear that the sympathetic nerve-system has the power of secreting a physiological substance which reacts upon the system as a tonic. It seems feasible to suggest that if the system suffers from disease or irritation its power of secreting its own tonic would be lessened.

With reference to the skin-pigmentation which is so characteristic of disease of the chromaffin cells, various explanations have been offered. Halle states that the suprarenals contain an enzyme which converts tyrosin into adrenin, and Adami has shown that tyrosin can be oxidized into melanin; thus a failure on the part of the sympathetics to manufacture adrenin may result in the formation of melanin.

It seems to me that we have fair ground for belief that the thyroid secretion has a definite function in maintaining the health of the skin. That the administration of this extract has proved most beneficial in certain skin-diseases is undoubted. In icthyosis and psoriasis—two diseases which resist medical treatment—marked benefit has resulted from treatment with thyroid extract.

In my cases of exophthalmic goitre I have noted the distinct change in the complexion and the return to normal as the disease was mastered. Granted the anatomical fact that the sympathetic gives a double supply to the skin, we are fairly justified in assuming that normal skin-health indicates a normal nerve-balance, and a disturbed balance may well be followed by a disturbed balance of skin-tonic secretion.

It seems scientifically impossible to believe that the ductless glands are not under definite nerve-control; and I think that when we speak of disease of such glands, instead of disease of their control, we are putting the cart before the horse.

It seems to me much more correct to argue that symptoms of hyperthyroidism mean a disturbance in the nerve-supply of the gland than to assume that the gland itself is at fault. It would be equally fair to accuse the salivary glands of disease because a mental impression of hunger causes an increased flow of saliva.

The symptom of exophthalmos has been the subject of much conjecture. In cases in which a post-mortem examination has been possible an undue amount of fat has been found in the orbit. That this should be due to the action of the thyroid extract seems improbable, when we consider that the majority of cases of hyperthyroidism are wasted, and also that obesity is often successfully treated by thyroid extract.

Granted the increased blood-pressure, the constant pulsation, and the pulsation so often seen in the retinal arteries, I feel it is not unreasonable to suggest that nature is trying to prevent damage to the eyeball by providing the extra fat as a shock-preventer.

The Cause.

Both Addison's disease and exophthalmic goitre are most frequently seen at the middle period of life.

Exophthalmic goitre affects females more often than males, and this is reversed in Addison's disease.

That there is a close connection between the generative organs and the thyroid is undoubted. Even simple goitres increase in size at the menstrual period.

At a time of life when the generative organs are retrogressing, may it not be possible that the nerve-supply is being diverted into other channels, and that other organs are receiving more nerve-stimulation than at an earlier period of life when the balance is more steadily adjusted.

It is remarkable that so many cases of both Addison's and exophthalmic goitre give a very definite history of mental worry, fright, or long anxiety. That the sympathetic system is not intimately connected with the higher cerebral centres is inconceivable. Long-continued cerebral irritation must have a detrimental effect upon this intricate system; and if the theory of balance is accepted, what should we expect but a disturbed balance in the nerve-supply of important organs.

It may be a far cry to suggest that some day we may seek the origin of cancer in the disordered chemistry of the body produced by disturbance of the sympathetic balance rather than in some new germ.

In conclusion, I would like to advance the suggestion that radium and X-ray radiations are successful in skin-cancer and in the cases I have recorded because they act on the nerve-control—in the former acting upon the disordered skin-nerves, in the latter upon the nerve-terminal in the enlarged gland.

PERICOLITIS DEXTRA.

By E. D. Aubin, M.D. (Lond.), Auckland.

My chief reason for introducing this paper is to induce some consideration of the symptoms and pathological conditions attributable to adhesions and adventitious membranes in the neighbourhood of the ascending colon, and more especially in the matter of their differentiation from appendicitis.

The abdomen, as we all know, is frequently opened for appendicitis, and the appendix is found to all appearance quite normal. The surgical wish that is father to the thought may detect a slight kink, some congested vessels beneath the peritoneal coat, or some other suspicious circumstance, and the appendix is removed. If, however, a further investigation is made, it may be found that a filmy membrane stretches outwards across the colon, or that the colon is crumpled or corrugated at one or more points by bands of adhesion, or that the caecum is abnormally mobile. If the abdomen is opened by an inch gridiron incision these conditions will escape notice, and the patient will continue on his painful colonic career, though perhaps consoled by the fact that he no longer possesses an outworn relic that menaces his health and his life.

I am using the title "pericolitis dextra" to include two different pathological conditions which until recently were not differentiated. I will distinguish these as inflammatory and developmental pericolitis. The name is not really applicable to the latter condition, which the balance of modern opinion does not attribute to inflammation, but is used in default of a better. The name "membranous pericolitis" is open to the same objection.

1. Inflammatory Pericolitis.

In this condition adhesions are formed in connection with the ascending colon, caecum, and appendix as the result of inflammation. They may be diffuse or patchy; the whole bowel from caecum to hepatic flexure may be involved in a mass of adhesions; or one or more scattered bands tying the bowel down may be present. The caecum is most usually affected, a circumstance which no doubt gave rise to the old name "perityphlitis." The chief causes are appendicitis, extension from pelvic inflammation, pyosalpinx, &c., extension from pericholecystitis, perigastritis, &c., tubercular peritonitis, dysentery, malignant disease. Arbuthnot Lane would include constipation, with the production of protective adhesions to counteract the sagging of the bowel. The adhesions are white and tough, irregularly distributed, and involve other parts besides the colon; they contain few vessels. The symptoms are similar to those of class 2, which I will discuss under that heading. I would only emphasize the extreme importance of an accurate history. If we except constipation, the importance of which as a causative factor is doubtful, inflammatory pericolitis is always preceded by a more or less acute illness. In some cases, such as an attack of appendicitis in infancy or childhood which has been forgotten or overlooked, it may be very difficult to get a clear history, but by careful inquiry the probability of such an attack having occurred may be arrived at.

2. Developmental Pericolitis.

Of this I recognize two forms—(*a*) Diffuse or membranous pericolitis, and (*b*) localized pericolitis.

Diffuse pericolitis is represented by Jackson's membrane and pericaecal membrane. Two other associated conditions are also to be described—namely, mobile caecum and Lane's kink.

Membranous pericolitis was first described as a distinct entity by Jackson in 1908. In this condition a membrane usually thin, but sometimes quite dense, stretches across the ascending colon, losing itself in the outer reflection of the mesocolon on to the abdominal wall. It looks like a separate layer of peritoneum, but contains numerous blood-vessels. Jackson gives the following description of one of his first cases ("Annals of Surgery," March, 1913): "From a point just at the hepatic flexure to 3 in. above the caput there spreads from the parietal margin to the internal longitudinal muscle-band a thin vascular vein, in which long straight unbranching blood-vessels course, most of which are parallel with each other, and take a slightly spiral direction over the colon. The appendix is not implicated in any way. Coursing with the blood-vessels are numbers of shining narrow bands of connective tissue, which gradually broaden as they go, and end in a slightly fan-shaped attachment at various points on the anterior and inner surfaces of the colon. At these points the gut is held in rigid plication."

The membrane does not, as a rule, involve the caecum or appendix. In one of Jackson's cases it extended on to the jejunum, causing clinical symptoms of pyloric stenosis.

In the form described by Jackson the caecum was usually unaffected. In another characteristic form the caecum is surrounded by a membranous sac, in which the caecum slips about like a foetus in its membranes. Pilcher describes a number of such cases which he operated on. As an illustrative case I may mention the following: A woman aged forty suffered for some weeks from severe appendix pain, and was found to have, besides tenderness over the appendix, a large fibroid uterus. Hysterectomy was performed, with removal of a thickened appendix. The caecum lay in one of these membranous sacs. I did not interfere with it, as it was not evident that it caused any symptoms. In all cases of which I have knowledge where this pericaecal sac has been present there has been a good deal of coexistent pelvic peritonitis, or peritonitis resulting from appendicitis. It is not clear what the connection between the two is. If we take the view that the sac is of developmental origin the coexistence of the two conditions must be accidental; or possibly the interference by the membrane with the action of the bowel may set up a congested condition of the neighbouring tissues, rendering them more liable to infection. It is difficult to see how a loose enclosing membrane such as this could be the result of inflammation alone.

Etiology.

Though Jackson's membrane is in all probability congenital, its exact method of production still remains obscure. It may be inferred that it is formed during the descent of the caecum from the neighbourhood of the liver to the right iliac fossa; the normal evolution of the peritoneum is interfered with, resulting in the production of abnormal connections and attachments. This is supported by the fairly frequent discovery of Jackson's membrane in the foetus. Magarey (Aust. M. Gazette, Oct., 1913) found, fully developed, Jackson's membrane in two nine-months foetus in which there was apparently no indication of an inflammatory process.

The membrane has been held by some to represent foetal omentum which in the natural order of things should have been absorbed.

The upholders of the inflammation theory allege repeated infections of the peritoneum from the mucous membrane of the bowel by means of the lymphatics and blood-vessels. Lane's constipation theory has already been alluded to.

Symptoms.

The membrane may be present without giving rise to any symptoms. These are usually due to interference with the proper movement of the intestine. De Quervain attributes them chiefly to faulty innervation.

The outstanding symptom is pain, most often in the region of the appendix. According to Jackson it is definite and abrupt in its onset, but my own impression from the cases I have observed is that its onset is rather gradual. It increases in intensity if left untreated. The following is an illustrative case: Mrs. H., aged forty-eight—Pain in the appendix region had been coming on for about five years, gradually getting worse, but never very severe. It gave rise to considerable distress, but was not attended by vomiting or rise of temperature or pulse, and did not particularly affect the general health. She was operated on by me for presumed appendicitis ; the appendix, however, proved to be normal in appearance, but the ascending colon was covered by a typical Jackson's membrane.

The pain may be mainly confined to the region of the hepatic flexure. An example of this is the following : Mrs. M., aged about forty-five, suffered from what appeared to be typical attacks of gall-stone colic. At operation a small strand of adhesion was found attached to the tip of the gall-bladder, but the gall-bladder itself was apparently quite healthy and free from gall-stones. The hepatic flexure was bound down firmly by membrane, division of which relieved the symptoms.

The pain is not, as a rule, so definitely localized as in appendicitis, but may extend upwards along the colon or backwards into the loin. Speaking generally, we may say that pericolitis may be suspected where pain of a progressive character exists in the area occupied by the ascending colon, and cannot be definitely ascribed to such causes as appendicitis, renal colic, cholecystitis, &c. The pain is usually aggravated when the caecum or colon is distended with flatus, and relieved when, by pressure, massage, or other means, the gas is expelled. The points of tenderness correspond with those where pain is felt, but are not very definitely localized.

Another common symptom is gaseous distension of the caecum and lower colon. This distension may form a distinct prominence in the iliac region. It occurs especially in the localized form where the bowel is constricted. The patient usually suffers from indigestion, and may become weak, irritable, or neurasthenic—as, indeed, he may do in any chronic disease of the intestinal tract. If obstruction is marked vomiting may occur. Constipation usually exists, but occasionally a mucous colitis supplants it.

Pulse and temperature are not much affected.

Enteroptosis may be found as an associated condition, in which case the symptoms of a prolapsed and probably dilated stomach, V-shaped transverse colon, and loose kidney will be added to those I have already enumerated.

Localized Pericolitis.

In this form one or more scattered bands are found binding the bowel down at certain points. The commonest position for these is at the hepatic flexure, where they sometimes form almost a diffuse membrane covering the flexure and first part of the transverse colon, and producing an acute-angled kink in the bowel. At the flexure the band may be firm and hypertrophied, partly no doubt on account of the drag of the colon downwards, especially if constipation has been present, as has been pointed out by Lane. It may cause kinking of the bowel and symptoms of obstruction. About the middle of the ascending colon isolated bands are sometimes found, possibly taking the place of Jackson's membrane ; they cause a corrugation of the bowel, and may considerably narrow its lumen.

Mobile caecum is probably due to the lower colon being anchored by membrane, the caecum remaining free to be pushed in various directions by the weight of faeces, distension with gas, &c. It may be diagnosed by a palpable or obvious distension of the caecum with gas, the distension subsiding when the gas is expelled by pressure with the hand on the abdomen, and by the relief of pain when the caecum becomes deflated.

Lane's kink is probably another manifestation of localized pericolitis. It is due to a band of adhesion passing from the ileum a few inches from the ileocaecal junction backwards and downwards. In this condition the obstructive symptoms are likely to be more marked, and the pain more prolonged, and situated between the caecum and bladder.

Differential diagnosis of membranous pericolitis: Most of the points of diagnosis have already been sufficiently indicated. The membranous is distinguished from the inflammatory form by the absence of any history of acute illness. This may be rendered difficult in cases where inflammatory has supervened on membranous pericolitis, and may be impossible without direct inspection. Appendicitis is, of course, more apt to occur in a membranous case, owing to the appendix being kinked by an anomalous arrangement of the meso-appendix. In the differentiation of pericolitis from appendicitis Jackson remarks on the diffuse tenderness in the former unaccompanied by any rigidity of the rectus. The pain also does not begin in the epigastric region as it does frequently in appendicitis before locating itself in the iliac fossa.

Treatment.

I do not propose to enter into the question of treatment in any detail. Careful dieting, avoidance of constipation, and massage are indicated. In persistent or severe cases operation should be resorted to, and the membrane divided or dissected away.

ANGIONEUROTIC OEDEMA.

By W. C. W. McDowell, M.D. (Edin.), Auckland.

Angioneurotic oedema has been regarded commonly as a comparatively minor malady, such, for instance, as urticaria. Such a view, however, has become nowadays far from wholly true. A close study of the recent rapidly increasing literature of the subject fully establishes the fact that angioneurotic oedema includes two distinct classes of cases—(1) "Solitary" cases; (2) "family" cases.

It is from cases in the first class alone that has been derived the idea that it is a trivial ailment. The severity and gravity of its manifestations in cases of the second class place angioneurotic oedema in quite a different category. Believing that the serious nature of these "family" cases is not generally recognized by the profession, I have ventured to present this paper in the hope of making the facts concerning these cases more widely known.

Symptomatology.

The cutaneous or subcutaneous oedema is the cardinal symptom common to both types of angioneurotic oedema. The swellings occur in all parts of the body, the lips, eyelids, cheeks, and forehead being the "sites of election." Acuteness in their development—in a few hours attaining full height—is peculiarly characteristic; and so also is their transient existence—measured at most by several days. They ordinarily average 2–10 mm. in diameter. They are usually distinctly circumscribed from the surrounding surface. The colour of the skin is, as a rule, unaltered, but is sometimes paler. It is noteworthy that when, very rarely, the skin is slightly reddened there is little, if any, feeling of itching. The only subjective sensation is that of discomfort through tension of the area involved. The swelling does not at all pit on application of pressure. No perceptible effect is left on the tissues after the oedema has disappeared.

It is remarkable that the attacks usually come on during sleep—in the early hours of the morning—owing probably to the physiologically determined fact that the vaso-motor system is then most readily liable to disturbance of equilibrium. This description of the cutaneous oedema also mainly applies to the oedema of the mucous membranes readily visible to inspection, as in the lips, tongue, buccal cavity, and pharynx.

What may be described as the laryngological symptoms are with rare exceptions only met with in the group of "family" cases. The oedema, then, chiefly involves the epiglottis and the aryteno-epiglottidean folds, inducing distressing suffocative symptoms, followed frequently by a tragically sudden end to life.

The terrible dread of recurrence is a perpetual obsession to those who have once experienced this oedema of the glottis. Knowing how little time is available for tracheotomy, some unfortunate sufferers perpetually wear a tracheotomy tube. Happily in some cases the well-known sudden termination of such oedema soon brings relief to the patient, and he escapes with his life.

The symptoms of abdominal or intestinal pain deserve especial comment. They are almost always confined to the "family" group, and are, indeed, highly characteristic of it. In 1888 Professor Osler noted these symptoms in recording a "family" series, and enlarged upon the subject in an instructive paper entitled the "Visceral Relations of the Erythema Group," published a few years later. These pains are often of an excessive nature (comparable in severity to those of a woman in labour), lasting for many hours, and often requiring the use of large doses of opiates before being relieved. In many cases they are accompanied by copious vomiting. These attacks are frequently associated with or alternated with outbreaks of cutaneous oedema; but often, too, they precede for years the onset of the characteristic swellings in the skin. Whilst there seemed every justification for supposing that these pains were due to localized oedema of the gastro-intestinal mucous membrane, it remained for later investigation to establish this as a fact. Morris reported the following interesting case in the American *Journal of Medical Science*, 1904: "A man, twenty-one years old, had suffered from the usual cutaneous symptoms of angioneurotic oedema since the age of twelve, accompanied with intestinal pains. At seventeen he required tracheotomy to relieve oedema of the glottis. In July, 1903, when the case was recorded, he awakened in the morning with a swelling under the shoulder-blade; at 4 p.m. his throat was affected, and at midnight tracheotomy had to be again performed to relieve him. His chief complaint on admission to the hospital was of the abdominal pain, nausea, and vomiting, from which he was accustomed to suffer at intervals of three or four weeks. While he was receiving lavage a piece of the mucous membrane of the stomach became detached, and was brought up to the surface. It measured 13 mm., and was 4 mm. in thickness." It was stained and examined microscopically, and a minute description appeared in the paper published. In regard to the possibility of the tissue having been incarcerated in the stomach-tube, Morris says, "It can be dismissed, as the removal of the test meal with the subsequent lavage was performed by a most experienced operator. As the piece of tissue was undoubtedly obtained from a wound inflicted by the end of the tube at the time when the stomach was being washed, the conclusion is forced upon one that there was an acute non-inflammatory oedema of the gastric mucosa."

I should like to make a passing reference to the subsequent history of this case. After leaving the hospital he had many attacks of oedema, and once or twice had signs of laryngeal obstruction. When he retired to bed on the 3rd January, 1905, he was apparently in good health. His parents, however, were aroused by hearing a noise, and on entering his room they found him propped up in bed, with the front of his nightdress covered with blood. He died before the doctor arrived. The autopsy showed an extreme grade of oedema of the larynx, involving the epiglottis, the aryteno-epiglottidean folds, and the true and false vocal cords.

Another effective illustration of the part played by oedema in causing these intestinal symptoms is the case published by Harrington in the *Boston Medical and Surgical Journal*, 1905: "A girl, aged twenty-six, had her first attack of angioneurotic oedema at age of eleven. The swellings came on hands and feet at intervals of not less than three months, and the lips were often so swollen that eating was attended with difficulty. She also had attacks of abdominal pain, lasting for twenty-four hours, with nausea and vomiting—as much as one or two quarts at a time. The pain suggesting biliary colic, an operation was performed. There was found a good amount of clear free fluid among the intestines. The intestines were engorged with blood. At a point a short distance from the ileo-caecal valve a cylindrical enlargement of the ileum, 2½ in. long, was brought to light. It entirely surrounded the gut, increasing the bowel-circumference to twice its ordinary size. The swelling was apparently in the bowel-wall, elastic to touch, and did not pit on pressure. It could be readily understood how such an infiltration could derange the peristaltic action of the intestines. The engorgement of the intestines and the free fluid were undoubtedly explained by the effort to force down the lesion, which was actually in the intestinal wall."

In connection with this question, I wish to direct your attention to some interesting features in the history of a family I have met with in the course of my own practice recently. I was called in to see an infant, aged six months, with symptoms of threatened intussusception. The mother was greatly alarmed, as well she might be, I could readily see, when she told her family history. One of her infants at the age of four months passed blood and mucus, collapsed, and died within twenty-four hours. Another infant, aged eight months, subsequently showed precisely the same symptoms, and died within twenty-four hours also. Then came the following suggestive fact: that her son, now aged eleven, a few years ago began to show signs of swellings on the face, but more especially on the head, where the swellings were so large that he could not, while the attack was on, wear his hat. When she took him to the doctor on the first attack, the doctor said he must have been eating pork or native crayfish, evidently diagnosing the case as one of urticaria. His mother said he had not had either of these articles of diet. He has had a number of attacks of a similar character, and once within the last few months ; but the parents could not prevail upon the boy to come to see me, although I particularly desired them to do so, when he was affected. I have little doubt that he suffers from angioneurotic oedema. The patient I first saw had another passage of blood and mucus at the age of twelve months, and at my suggestion was taken to the Auckland Hospital, where an operation was performed, and an intussusception of the ordinary type was successfully reduced. Two months afterwards the infant was threatened with another attack, which, fortunately, soon passed off. I must also allude to another striking fact in the record of this remarkable family. A few years ago a little girl, aged five, showed signs of some throat-trouble, and died after an illness of two or three days' duration. As far as I could gather, the doctor had no clear idea as to the nature of the illness, but thought it must be diphtheria. I greatly regret it has been impossible to get any clear details of this case, but, reviewing the whole history of the family, I think it is not improbable that it was a case of oedema of the glottis.

The occurrence of these repeated cases of intussusception in a family in which angioneurotic oedema probably exists raises the important question as to whether the exciting cause of intussusception in members of the " family " class, and possibly in other cases too, may not be a localized oedema in the bowel-wall, paralysing peristalis in that part of the bowel, and preparing the way for invagination by increased peristalis in another portion.

I find that when angioneurotic oedema is well established a patient is rarely free from one or other of the symptoms I have described for more than three or four weeks.

Etiology.

Regarding the etiology of this malady, I should like first of all to point out the fact that the proportion of males affected as compared with females is as two to one. In view of the notable proneness of females to nervous disorders generally this ratio is certainly surprising. The average age at which manifestations of the disease first appear is, taking both classes into consideration, twenty-one years, though it is to be noticed that " family " cases mostly show signs in early childhood, or at least before puberty. Temperament of a nervous type is recorded in the majority of cases, though it is almost uniformly stated that symptoms of an hysterical or neurasthenic character are completely excluded. There seems lacking in medical nomenclature a precise term for the peculiar nervous temperament presented by many of these cases. Out of some eight cases I have personally observed I have detected in three or four a marked degree of psychical excitability. They are easily worried, and anxious thoughts about themselves or their affairs frequently take possession of their minds. The onset of the disease in the first case I saw—a business man, aged sixty-nine—was undoubtedly brought on through the idea that he had been wronged in a land transaction by a formerly trusted friend. For a while he appeared unable to think or talk of anything else. After the first outbreak he had recurrences at intervals of two or three months for about three years. For the last six years he has been quite free from attacks. Another of my cases—a young man, struggling to release his backblock farm from the burden of mortgage—had frequent attacks for several years; but since getting into calmer water financially the outbreaks of oedema have become rare.

Out of some 210 cases, with the records of which I am acquainted, I have found that at least 110 belong to the "family" class—that is to say, over 50 per cent. This large proportion suggests the probability that careful investigation would elicit the influence of heredity in many other cases.

I have collected the genealogies of thirteen families, whose members number altogether 206, and of these no less than 103—again 50 per cent. —have been afflicted with angioneurotic oedema.

I should like once more to emphasize the shockingly bad prognosis in regard to life that is the lot of a member of a family subject to this dread malady. Out of the 110 individuals so affected, no less than thirty, or 29·12 per cent., have had their lives ended with symptoms of suddenly developed asphyxia, resulting in the majority of cases, there can be little doubt, from oedema of the glottis. An examination of the accompanying genealogical tables will, I feel sure, convey the conviction to your minds that heredity is indeed the factor of prime importance in the etiology of this disease.

Chills and slight traumatisms, it may be added, seem to be capable of exciting attacks, especially in the "family" cases. Dietary appears to be practically devoid of etiological significance, as far as my experience goes.

Diagnosis.

But brief space need be given to the question of diagnosis. The oedemas associated with heart and kidney diseases, with organic nervous diseases such as syringomelia or tabes, with hysteria and other functional neuroses, must be ruled out of consideration by the fact that a state of good general health has been established as one of the prominent features in subjects of angioneurotic oedema. The one ailment which presents any diagnostic difficulty is urticaria; but, apart from some rarely found puzzling transition forms, the two complaints can be readily differentiated. In angioneurotic oedema the oedematous swelling is ordinarily large, pale, free from itching, with no accompanying fever, and situated on the exposed parts of the body, and no special article of diet is to be held responsible for its onset. In urticaria, on the other hand, the swelling is smaller, red in part, with an intolerable itching, and with more or less fever, and is not uncommonly situated in the parts of the body covered with clothing, and more often than not some article of diet is directly and invariably the cause of the outbreak. Still, it must be acknowledged that the two conditions are of close relationship. Unna contends that urticaria concerns chiefly the true skin, while angioneurotic oedema primarily affects the subcutaneous layer, and involves the skin by secondary extension.

Prognosis.

Prognosis must be based upon the fact whether the case belongs to the "solitary" or "family" type. If to the former, the outlook in regard to longevity is apparently favourable, especially if neither tongue nor throat is affected. In regard to complete recovery, the prospect is not so satisfactory, for after long periods of intermission the attacks are often renewed. In the "family" cases the prognosis can be but a grave one. Apart from the jeopardy to life, there are, as Ensor points out, often questions to be considered regarding the patient's prospects in life—namely, about marriage and life assurance. The possibility of suspicion of foul play and the slur of suicide may find occasion to arise through the often tragically abrupt termination of life in these cases. The risk of the induction of dangerous oedema through extraction of teeth, or slight surgical operations, or even through the use of hypodermic injections, must not be lost sight of.

Therapeutics.

No therapeutic measure has so far established a claim to be of special service. The use of arsenic and of atropine has been advocated, on account of their effects upon the nervous system. Nitro-glycerine and thyroid extract have been utilized on account of their influence on the circulation of the blood and internal secretions, and also ichthyol, which has proved of use in the vaso-motor disturbances of the climacteric period in woman. Chloride of calcium has also been tried, with a view to increase the coagulability of the blood. To combat the possible existence of auto-intoxication, use has been made of the whole series of drugs known to influence the movements of the bowels or to antisepticize their contents.

My own experience leads me to the belief that much good can be done by suggestive treatment, designed to bring about the culture of equanimity of mind to control the psychical excitability which exists in many patients.

Pathogeny.

The pathogeny of angioneurotic oedema is, it must be confessed, in its details at least, much lacking in clearness. There can be little doubt, however, that an inherited or acquired instability of the vaso-motor nervous system is the basis upon which the characteristic manifestations are built up. There are good grounds for believing that the oedema is not solely due to the disturbance of the circulation of the blood, but that it results from an increased accumulation of lymph in the tissues, occasioned either by the nervous excitation of the cells lining the capillary vessels to enlarged secretion or by the nervous influence upon the capillary walls allowing a freer transudation. Some authorities have expressed the opinion that the exciting cause of the oedema is to be sought for in auto-intoxication, due to some defect in the metabolic processes of digestion, but such a view seems to hold good for a comparatively small number of recorded cases — indeed, the "family" cases, as a whole, appear to be dominated by purely nervous or psychical determinants. This difficult problem of pathogeny—as, indeed, the whole subject of angioneurotic oedema—is fully and ably dealt with by Dr. R. Cassirer in his masterly monograph, "Die Vasomotorisch—trophischen Neurosen," the second edition of which has just been published.

Abstract of Genealogical Tables exhibited on the Occasion of Reading of this Paper.

Recorded by Dr. C. A. Ensor (Guy's Hospital Reports, 1904, page 111)

Members of family	81
Affected with angioneurotic oedema	28
Died	13

Recorded by Professor Osler (American *Journal of Medical Science*, Vol. 95, page 362)—

Members of family	36
Affected	20
Died	2

Recorded by Dr. Mendel (Berlin Klin. Woch., 1902, page 1126)—

Members of family	13
Affected	9
Died	5

Recorded by Dr. Fritz (Buffalo Med. and Surg. Journal, 1893–94)—

Members of family	9
Affected	8
Died	5

NOTE.—It is of the utmost importance to bear in mind that the deaths referred to in the above records were in almost every case ushered in by symptoms or signs indicating oedema of the glottis, and culminated with tragic suddenness.

SPOROTRICHOSIS IN NEW ZEALAND.*

A PRELIMINARY NOTE ON FOUR CASES OF GENITO-URINARY SPOROTRICHOSIS DUE TO THE *SPOROTRICHUM GOUGEROTI.*

By SYDNEY T. CHAMPTALOUP,

Professor of Bacteriology and Public Health, Otago University, and Sub-Dean of the Medical Faculty.

DURING the last two years I have endeavoured to locate a case of sporotrichosis in New Zealand, and to that end have investigated material from all suspicious lesions from which tubercle and syphilis could be excluded.

While working at a culture of the *Sp. beurmanni* which Dr. de Beurmann kindly sent me, I received from Mr. F. L. Armitage, of the Clinical Laboratory, Auckland, several films which he had prepared from the centrifuged urine of a case of suspected genito-urinary tuberculosis, under the care of Mr. Savage. The laboratory finding to tubercle was negative. These films showed a few slightly acid fast oval bodies, not unlike yeast-cells. Having obtained catheter specimens of urine from the case, I was able to demonstrate the presence of Gram positive oval spores, resembling those of a *Sporotrichum*, and cultures on 4-per-cent. neutral glucose agar, showed after forty-eight hours a moderate number of pigmented colonies, which were seen under the low power of the microscope to present all the features of a sporothrix.

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* As the Pathological Section did not eventuate, the substance of this paper was laid before the Medical Section, Australian Medical Congress at Auckland, February, 1914.

Since then I have received several other specimens of urine from Mr. Armitage, through the kindness of Mr. Savage, Dr. Kenny of Te Aroha, Dr. Derrick of Thames, Dr. Bennett of Devonport, and Dr. Sweet of Auckland, in all of which oval Gram positive cells have been present, but from which it has not been possible at all times to isolate a sporothrix. Some of the cases gave cultures of a torula mixed with a sporothrix, while at other times one or other was present alone. Of this association I shall have more to say in a subsequent publication.

In each of the four cases in which the sporothrix about to be described was isolated, there was a suspicion of genito-urinary tuberculosis, but guinea-pig inoculations have always been negative to tubercle.

In catheter specimens of urine, Gram positive spores were present along with a varying amount of pus, *B. coli*, and other organisms.

The cultures which we obtained most nearly resembled the description of the *Sporotrichum gougeroti* given in Kolle and Wasserman's Handbuch, but, owing to slight cultural differences, and having no culture of Gougerot's sporothrix for comparison, I was unable to make a definite classification.

I submitted cultures to De Beurmann in Paris. He handed them to Dr. Gougerot, who replied that our cultures were identical with the sporothrix first described by him in 1907(1). Two other cases are known—those of Adamson and of Sandor (unpublished)(2)—so that our culture is the fourth on record. The cultures from these cases have been definitely identified by Gougerot, and to him belongs the credit of having identified our cultures for us.

Schenk was the first to describe a case of sporotrichosis in 1898(3); Hektoen and Perkins further studied the organism, and published a case in 1900(4) (*Sp. schenki*).

The second fungus described was that grown by De Beurmann and Ramond in Paris in 1903, in Sabouraud's laboratory(5) (*Sp. beurmanni*).

The *Sp. gougeroti* was isolated by Gougerot in 1907 from the pus of a deep closed gumma of the leg in a tubercular and syphilitic patient(6).

The first definite case of sporotrichosis recognized in Great Britain was described by Walker and Ritchie. The organism resembled the *Sp. beurmanni*(7).

There are several other pathogenic varieties of the fungus, each of which may be the cause of a special sporotrichotic disease, indicated by the name of the particular discoverer, while Saccardo has enumerated over one hundred kinds in nature. De Beurmann's specimen is the only pathogenic variety so far found in nature, Gougerot having discovered it growing on the bark of a tree, and on grass, in the Pyrenees(8).

Before the work of De Beurmann and Gougerot the disease was confused with tuberculosis and syphilis, its main clinical manifestations being of a disseminated gummatous nature, either ulcerated or not ulcerated. Almost any part of the body may be affected, but the kidney seems so far to have escaped, except in one published case(9). Our four cases were all infections of the urinary tract.

Microscopical and Cultural Appearance of a Typical Sporotrichum (Sp. Beurmanni).

When grown on dry glass after the method of Gougerot(10), or in hanging drop preparation, the fungus is seen to consist of a segmented irregularly ramifying and finely granular mycelium, about 2μ in diameter, on which the spores are inserted. The spores are oval, spherical, or pear-shaped, and measure from 3μ to 4μ long by 1·5μ to 3μ broad. They may be colourless or tinted, and placed singly or in bunches along the side or at the end of the mycelial thread.

The colonies of glucose agar are at first whitish, but in a few weeks assume a chocolate-brown colour, owing to the development of pigment. Where numerous the colonies fuse to form a thick somewhat tough and convoluted film, which is more or less adherent to the medium. Single colonies are convoluted, raised, and surrounded by a radiating areola.

The virulence of the parasite for the human subject is weak, and an infection is compatible with almost perfect health.

The experimental virulence varies; some strains are almost non-pathogenic to laboratory animals, young white rats being most susceptible. In these animals an intraperitoneal inoculation is followed in about ten days by a characteristic orchitis, and the spores may be found in numbers in the testicle.

It is rare to find evidence of a mycelium in the tissues, and the spores are sometimes difficult to distinguish from degenerate nuclei of cells. Our case No. 4 is specially interesting in that Mr. Savage secured a specimen from the pelvis of the kidney, in which Mr. Armitage was able to demonstrate a well-marked mycelium and spores.

Brief Description of our Sporothrix (Sp. Gougeroti).

Microscopical Appearance in the Urine.

In direct smears from the centrifuged urinary deposit the spores are oval or round, and are similar to those of the *Sp. beurmanni*. The number of spores varies in different specimens from the same patient; sometimes a prolonged search is necessary to find them, while at other times the bulk of the sediment consists of spores.

The spores usually stain readily and deeply by Gram's method, though care is occasionally necessary in decolorizing. They are not acid fast, but if decolorized with 5-per-cent. sulphuric acid some specimens tend to retain the red stain.

In specimens which have remained in the post for two or three days before reaching the laboratory it is sometimes impossible, when Gram's stain is used, to distinguish a spore from the broken-down nuclei of pus-cells, or from red blood-corpuscles. In such cases plating out on 4-per-cent. neutral glucose agar is necessary.

Occasionally spores are seen within the leucocytes.

Microscopical Appearance of Culture on Dry Glass.

This method was first suggested by Gougerot(10). A sterile 3 x 1 glass slide is covered with a thin film of glucose agar, and, after inoculation, is set in a flat piece of cork and placed in a jar containing a small amount of fluid culture-medium. After twenty-four to forty-eight hours' incubation at 25° C. the slide may be examined microscopically, when the spores will be seen to have divided and to have given rise to a branching mycelium. If this division is observed on a cover glass which is smeared with glucose agar, and then inverted over a sunk cell as in a hanging drop preparation, the division of the spores and growth of the mycelium can be watched from day to day under the microscope.

In a hanging drop preparation the spore does not at first give rise to a mycelium, but divides much in the manner of a yeast-cell, to form a chain of gradually elongating oval or fusiform cells, until a definite branching mycelium is formed. About the third or fourth day short conidial branches are given off from the mycelial thread, and on the apices of these a varying number of spores are formed. In some cases single spores, or clusters of spores, form on the side of the mycelial threads. The spores are both sessile and attached by slender pedicles, and easily become detached, especially in a fluid medium. The central portions of the colonies are often obscured by masses of free spores very much resembling an agglomeration of yeast-cells. This central massing of the spores is, according to Gougerot, characteristic of this species.

Both spores and mycelium have a light-green tint when examined in the unstained condition. The mycelium is thicker than in De Beurmann's culture, and varies from 2μ to 6μ in diameter. The spores vary from 4μ to 8μ in diameter.

The growth has by this time a typical naked-eye appearance on dry glass. The central portions of each colony are seen as grey or grey-black heaped-up points, from which the branching mycelium spreads out over the glass in an arborescent manner.

Naked-eye Appearance of Cultures on 4-per-Cent. Glucose Agar. (Neutral to Litmus.)

Growth takes place most readily at temperatures ranging from 22° to 28° C., although slow growth will take place at 0° C. or at 37° C.

After thirty-six to forty-eight hours at 25° C. the growth is visible as grey or grey-black elevated points, which later became more heaped up, and densely black in colour. Growth takes place laterally, and into the substance of the medium, as fine radiating branches.

At the junction of the culture-medium with the glass wall of the test-tube the arborescent margin is well seen as it advances over the glass wall, and by placing pus or sediment containing the spores in this position a characteristic appearance is obtained in forty-eight hours.

The isolated colonies tend ultimately to fuse, and form a thick somewhat wrinkled felted film of intense black colour, and of tough consistency. It is not so tough nor has it such a wrinkled appearance as De Beurmann's culture.

The pigmentation is apparent from the first, whereas in De Beurmann's culture the brown pigmentation does not develop for days or weeks. In several of our cultures on this medium, especially on the drier parts of the culture, the growth has become covered with fine downy hairs of a mouse-grey colour. They give the culture the appearance of a mould. They are easily rubbed off, leaving the black wrinkled film beneath.

De Beurmann and Gougerot sum up the microscopic appearance of this fungus in cultures as follows: "On all media, whether rich or poor, the appearance is the same except for luxuriance of the colonies; the fixity of this fungus is thus remarkable" (6).

The cultural appearances on other media, and the relation of growth to temperature, light antiseptics, oxygen, &c., and the serum reactions and source of infection, will be considered in a subsequent communication.

Fermentation Reactions.

Our cultures differ in minor details in their fermentation reaction with various carbohydrates from those of Gougerot's culture(6), but these need further confirmation. We have not observed gas-production.

Pleomorphism.

In the primary cultures from urine we were somewhat puzzled by the appearance on the culture-plates of yeast-like forms and torulae, and we considered these to be pleomorphisms. Subsequent investigation, however, leads us to believe that these are distinct entities, and that they may play the part of sensitizing the tissues, so that infection by the sporothrix more readily takes place when it gains an entrance to the body. Gougerot(6) considers that his culture exhibits little tendency to pleomorphism. Our primary cultures have now been subcultured frequently over several months, and always show the same appearances.

Experimental Virulence.

Our cultures have so far proved a virulent for the rabbit, guinea-pig, white and brown mice by subcutaneous, intraperitoneal, and, in the case of rabbits, by intravenous inoculation. We were unable to obtain white rats in New Zealand, and had to import them from London. The supply will shortly be sufficient to enable us to complete this part of the investigation.

Geographical Distribution.

As far as I am aware, the disease is confined to the Auckland district, where the warmer climate may influence the growth of the *Sporotrichum* in nature. Mr. Armitage tells me that yeast-like cells are present in a number of urines sent him for routine examination, but it has not been possible to study each case. We have studied twelve cases completely, and only in four of these have the yeast-like bodies proved to be the spores of a *Sporotrichum.*

I have never found the condition in the South Island during a period of four years' observation, and we rarely find yeast-like cells in catheter specimens of urine in this district.

Clinical Summary of our Four Cases.

Case 1.—Under the care of Dr. Kenny, of Te Aroha. Patient, a male, aged thirty-five, came under Dr. Kenny's observation in 1905, but has been troubled with bladder symptoms as long as he can remember. No family history of tubercle. At age of eight was treated for tuberculosis of right hip—an abscess formed, which quickly healed after spontaneous evacuation. Bladder symptoms since 1895; severe haemorrhage in 1900. Was free from symptoms for two years, but since 1902 has had intermittent attacks. Was seen in 1905 by Dr. Kenny for symptoms of a mild cystitis, which was considered to be tubercular. A cystoscopic examination showed tubercular-looking ulcerations round the orifice of the right ureter, and for some distance along the trigone. Right kidney easily palpable, and a large tubercular (?) pyonephrosis occupying its outer two-thirds. Left ureter appeared free from disease. Operation advised, but refused. Three specimens of urine negative to tubercle. A fourth specimen has since given negative guinea-pig test. Specimens of urine showed "spores," *B. coli*, and other organisms. Cultures gave growth of *Sp. gougeroti*. Treatment by iodides commenced, but patient left district, and had course of bacterial vaccines elsewhere. Could not tolerate iodides, and difficult to get patient to submit to an effective course. Patient still under treatment.

Case 2.—Male, aged forty-four, latterly under Mr. Savage, Auckland. Patient had a right inguinal hernia for ten years, and attacks of pain in right iliac fossa for three years previous to April, 1912. He was then laid up for a month with inflammation of the right kidney. From this date to May, 1913, he had several attacks of pain, referred to the right kidney, with frequency of micturition, and pus and phosphates in the urine. X-ray examination and guinea-pig inoculation were negative. In May, 1913, Mr. Savage operated for the hernia, and removed the appendix. The appendix showed chronic inflammation, associated with chronic pericolitis of the ascending colon. The kidney was explored, with negative result. At the end of May, 1913, the urinary symptoms still persisted, and further samples of urine were submitted to Mr. Armitage, who, bearing our first case in mind, was successful in isolating and cultivating the *Sp. gougeroti*, along with *B. coli*, &c. Control specimens gave similar results in my hands. Unfortunately, the appendix was not available for histological examination after this interval, otherwise it might have cleared up the point whether the sporothrix reached the kidney through the bowel or not. The patient was put on large doses of potassium iodide, and made rapid improvement. The last report to hand (October, 1913) stated that the patient was almost well, and had returned to work after an absence of eight months.

Case 3.—Female, aged thirty-seven, no living children. Was sent to Mr. Savage from a township about eighty miles south of Auckland. Patient was operated on two years before seeing Mr. Savage, on account of pain in the right side, for which the appendix was removed and the uterus suspended, but without relief. A year later the right ovary was removed, again without relief. In March, 1913, Mr. Savage performed a laparotomy for pain on the right side, and frequency and pain on micturition. He found extensive adhesions all over the right side of the abdomen, the omentum being adherent to the appendix-scar, to the kidney, and all along the right side of the colon. The adhesions were most marked in the region of the right kidney. In spite of these being freed, and the omentum being removed to prevent recurrence of the adhesions, the pain returned in May, 1913. The patient was sent to Mr. Savage in the first place as a probable case of tubercular disease of the kidney, although at the time of operation he was unable to find any such evidence, as far as he was able to examine the kidney through an abdominal wound. No tubercle bacilli have been found in the urine on any of the occasions on which it has been examined. Sporothrix infection was not suspected at the time of operation, but in June, 1913, spores were found in several catheter specimens of urine from the right kidney, along with pus and *B. coli.* Cultures gave typical growths of the *Sp. gougeroti.* Patient improved under potassium iodide up till August, 1913, since when she has for the time being been lost sight of.

Case 4.—Female, aged thirty-one, unmarried, recently under care of Mr. Savage, F.R.C.S., Auckland. Patient has had kidney-trouble for nine years, with attacks of backache and haematuria at moderately long intervals. In January, 1914, examination with the X-rays, inoculation of guinea-pigs with urinary sediment, and cystoscopic examination were all negative. The ureters were then catheterized, and the urine sent to Mr. Armitage for examination, to whom I am indebted for the following report: " The urine from the right ureter showed on direct examination branching mycelium and spores. The urine from the left ureter was normal except for a few *Staphylococci*, which were regarded as a contamination. At first cultures showed only yeast-forms, but subsequently the typical sporothrix colonies appeared." The case is very interesting, in that a definite mycelium was recovered direct from the tissues—a rather rare occurrence. Unfortunately, the patient could not tolerate potassium iodide, which produced extensive urticaria of the head and face. She has quite recently been put on hydriodic acid, and already in a few weeks the attacks are less severe, and there is decided benefit. The condition of the urine shows a marked improvement, and disappearance of the spores."

In conclusion, I wish to thank Mr. Savage and Dr. Kenny for specimens and clinical notes, and especially Mr. F. L. Armitage for the energy he has expended in getting specimens and information for me, and in controlling many of the cultural details. Without his co-operation it would have been impossible to have continued the investigation, as the cases live in widely scattered districts, and in some instances it has taken several days for specimens to reach the laboratory.

I trust that this preliminary communication will draw attention to the disease in New Zealand, and to its clinical resemblance to tuberculosis, with which it is so often confused.

[Microscopical preparations from the urines and cultures, and a series of cultures illustrating different varieties of sporotriches, were shown at the Congress.]

BIBLIOGRAPHY.

1. De Beurmann and Gougerot. Bull et Mém. de la Soc. Méd. des Hôpit de Paris, June, 1907 (quoted).
2. Gougerot (personal communication).
3. Quoted by Page, Frothingham, and Page. Jnl. Med. Research, Aug., 1910.
4. Hektoen and Perkins. Jnl. Exp. Med., 1900.
5. De Beurmann and Ramond. Ann de Dermat et de Syphil, 1903, p. 678 (quoted).
6. De Beurmann and Gougerot. " Les Sporotrichoses," 1912.
7. Walker and Ritchie. B.M.J., July 1, 1911.
8. De Beurmann and Gougerot. Bull et Mém. de la Soc. Méd. des Hôpit de Paris, December 4, 1908 (quoted).
9. Rochard, Duval, et Bodolec. Gaz des Hôpit., August 12, 1909 (quoted).
10. Gougerot. " Kolle and Wasserman Handbuch der pathogenen Mikroorganismen," p. 222.

CONTRIBUTIONS TO THE HISTORY OF DISEASE IN AUSTRALIA.

By J. Burton Cleland, M.D., Ch.M. (Syd.), and E. W. Ferguson,
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I. Diphtheria.

Though the names "diphtheritis" and "diphtheria" were first invented by Bretonneau in 1821, the disease as a distinct entity seems not to have been generally recognized until the occurrence of an epidemic of sore throat on the French coast about 1855. From this time onwards it was more or less definitely differentiated by its clinical signs and symptoms, whilst the question of the diagnosis of individual cases was almost completely set at rest by the discovery of diphtheria bacilli in 1883 by Klebs, and its cultivation by Loeffler. It follows, therefore, that before the great pandemic in the late "fifties" and in the "sixties" of last century the actual identity of outbreaks of what is probably a very old disease indeed could only occasionally be ascertained. In the scanty medical literature of Australia previous to this date there is, as might be expected, little information to go upon.

Hirst (Handbook of Geog. and Hist. Path., vol. iii, p. 86) in his historical account of diphtheria, states, after lying more or less dormant for many years, the years 1857–60 were characterized by an explosive pandemic representing a new general outbreak of the disease. As regards Australia (p. 100), he says that according to Dempster (Trans. Calcutta Medical Society, 1837, vii, p. 357), there had been previous to 1837 occasional epidemics of a malignant kind of sore throat, but that the more general outbreak of the disease dates from 1858–59. He thinks it doubtful whether the disease started from Tasmania, as was thought (Trans. Epid. Soc., 1860, 1, p. 8; *Lancet*, 1872, No. 639: Leuesdorf's Nachrichten, 1874, viii, 78; 1875, 51; 1877, xi, 49). He states that it is certain that the number of cases and deaths in Melbourne in 1859–61 was considerable, and that the disease down to 1875 contributed no small portion to the total number of deaths at Sydney and Adelaide. He mentions Moore's account (*British Medical Journal*, 1859, October, p. 875; *Australian Medical Journal*, 1859, July), and Hall's (Trans. Epid. Society, 1865, ii, p. 73) of an outbreak in Tasmania in January, 1859, at two different places in the interior simultaneously; the epidemic seemed to have lasted some time.

The Australian epidemic of diphtheria, which appeared first in 1858, is dealt with in a masterly communication entitled "Remarks on the Introduction of Diphtheria into Victoria," by Dr. William Thomson in the *Australian Medical Journal* (July, 1872, p. 193). At this period, of course, the knowledge of the role of bacteria in the causation and spread of epidemic diseases was unknown. Dr. Thomson, in a skilful manner, brings to bear upon the question various facts known at the time. He brings forward arguments to show that it was unlikely that the disease began *de novo* from unhealthy surroundings, and that there was much to support the view that it was directly introduced into Australia by means of immigration. In a table which he gives of deaths from various diseases, he also calls attention to the fact that coincident with the appearance of diphtheria and of the registration of deaths from this cause there had been a marked increase in the number of deaths reported from croup, and he makes it clear that it was probable that a number of cases of diphtheria were erroneously tabled under this heading. The first death from recognized diphtheria in Victoria occurred in October, 1858, with, at the end of the year, a total of six deaths. In 1859 the number reached 280 deaths, and 636 in 1860. A reference to the table at the end of this article will indicate the number of deaths in succeeding years from diphtheria and croup. In reference to the epidemic, he mentions various papers which had appeared in the *Australian Medical Journal:* J. A. Moore (July, 1859) deals with an outbreak at New Norfolk in Tasmania, where the disease had appeared four months later than in Melbourne —namely, early in 1859; L. J. Martin (October, 1859) points out that while "the new disease," diphtheria, was committing such ravages and exciting such anxious attention in the Mother-country, they had been startled by its arrival at the Antipodes; Dr. Haddon (April, 1860) makes observations on the symptoms and treatment of cases; Mr. Lempriere alludes to the significancy of a single symptom; and Mr. McKenna deals with Sydenham's views upon the subject. Dr. Thomson also refers to the affinities of diphtheria and scarlatina, showing that many contended that the first named was only a form of the latter. Though the two might coexist in the same house, every clinical fact, he says, disproves their identity. The one conferred no immunity on the other, of which he gives an instance in a family at Hawthorn who had diphtheria in 1869, and two years later suffered from scarlet fever. He states that albuminuria in scarlet fever is the natural association, but the early period at which this appears in diphtheria proves it to be a primary lesion, whereas in scarlet fever it is invariably secondary. The infectiousness of diphtheria had been another keenly disputed fact. Dr. Thomson considered that he had communicated it to a dog by direct infection. He had just left a case in which he had removed the pellicle with his fingers, and, without washing his hands, in a few minutes had them licked by a large mastiff in full health. On the following morning the dog was ill and in a high fever; on the second day, prostrate, with mucopurulent matter and much frothy saliva flowing from the nostrils and mouth; on the third day the bricks around his kennel were covered with froth and purulent sanies, the animal having rapidly emaciated to a sad spectacle; and it died between the fourth and fifth day. The whole fauces were coated with dark-brown putrescent exudations. He points out that the healthiest and strongest were often the first and most severely affected, whilst ill health might be absolutely protective against this specific morbid poison.

J. A. Moore's paper, "Remarks on Diphtheria," appeared in the A.M.J. of 1859 (vol. 4, July, p. 166). He deals with an outbreak of the disease at New Norfolk, Tasmania, the first case being met with on the 5th January, 1859. In ten weeks he had treated 200 cases, and at the time of writing, 275. There were only six fatal cases in all; but in one family early in the outbreak three deaths occurred, together with one from "croup," three other members of this family being also affected, two severely. The fatal cases showed much membrane. He had seen scarlatina followed by diphtheria, and refers to fatal cases of diphtheria having occurred at Oaklands and Hobart, in Tasmania.

L. J. Martin, in the October issue (p. 253), deals with the treatment of diphtheria, which he refers to as "the new disease." His first case appeared in April, and he had eighteen, with seven deaths. Details of four cases are given.

J. W. Haddon (A.M.J., 1860, p. 95) writes on "Observations on Diphtheria as it appeared in Victoria in 1859." He says that "without stopping to discuss whether this is a new disease or not, he will proceed to describe the clinical symptoms," &c. His is a very good description, and records details of six cases.

C. Lempriere's communication (A.M.J., 1860, p. 118) is of considerable interest in the light of recent knowledge. He points out that the disease could be surely diagnosed by making a blister the size of a sixpence or a shilling on the upper part of the sternum. If the case is true diphtheria it will be found that "the blistered surface is covered with an exudate of plastic lymph ⅛ in. in thickness, and resembling the white of a poached egg." He advises that as soon as the diagnosis is thus established the exudation should be destroyed immediately, as it becomes a great source of annoyance, "and will spread and take on an erysipelatous character if left to itself; and for this I use a strong solution of caustic." This seems to be one of the earliest instances of diphtheritic infection of wounds. If a positive result were obtained by this method the diagnosis was undoubtedly certainly clinched.

J. W. McKenna (A.M.J., April, 1861, p. 95) discusses the late epidemic of diphtheria, measles, and scarlatina. From the descriptions given of diphtheria in England, he considered that the type met with in Australia was very much milder. He noticed the first case in Melbourne in 1859. The suburbs chiefly affected were Brighton, Campbellfield, Collingwood, Emerald Hill, Prahran, Richmond, and South Yarra. Many cases were not recognized as diphtheria until after other members of the family had been attacked more severely.

The years 1864 and 1865 show the first records of what was evidently diphtheria in Western Australia. These references have been unearthed by Dr. Cumpston, and recorded in a paper in the *Australasian Medical Gazette* (July, 1908, p. 352). He quotes from the *Enquirer and Commercial News*, 14th December, 1864, in which mention is made of persons being attacked by sore throats followed by a severe illness, young people being especially attacked, and fatalities occurring. A reference on the 13th January, 1865, shows that this sore-throat complaint was becoming very prevalent, and one on the 2nd June, 1865, states that another child had died from diphtheria. Dr. Cumpston mentions that a search into the papers for the preceding year did not reveal any reference to any outbreak of diphtheria on any of the vessels on their way out from England.

In 1864 Dr. John Day (A.M.J., February, p. 37) mentions the prevalence of diphtheria in Geelong during the last three months. Since the 18th November he had treated fifteen cases with a weak solution of permanganate of potash, all of whom recovered.

In 1865 W. L. Richardson, physician to the Ballarat Hospital, gives the result of seven years' experience with diphtheria, during which he had treated 220 cases (A.M.J., 1865, p. 209). Of eighteen deaths, six occurred from extension to the trachea, one from paralysis of the glottis, and nine from "putrid sloughing sore throat." As regards this last type he says, "It does *not* present the peculiar membrane of diphtheria, it does not commence in the tonsils, and it does *not* show a disposition to extend into the trachea, but it *does* involve the uvula, generally showing itself first as a sloughy appearance on one or both sides, and extending posteriorly into the pharynx. I cannot call it real diphtheria; it is a relation, a congener, an accompaniment, evidently flourishing under the same circumstances, and produced by analogous, if not identical, causes. I have included the cases in this record." In six of his cases there were two distinct attacks at various times. He found that "a mixture containing free chlorine is certainly of great value." (Even at the present day liq. sodae chlorinatae is used by some.) He attributes the disease to insanitary surroundings. It may be interesting to mention here the years in which he saw cases, with their numbers and their deaths. In 1859, 2 cases, 2 deaths; 1860, 6 cases, no deaths; 1861, 39 cases, 5 deaths; 1862, 27 cases, 3 deaths; 1863, 31 cases, 1 death; 1864, 69 cases, 6 deaths; 1865, 46 cases for six months and 1 death.

In 1868 (A.M.J., pp. 200 and 299) J. P. Murray writes on diphtheria and scarlatina. He tabulates the symptoms of the two diseases, which he thinks are really different forms of one and the same. He does not know how the term "new disease" arose, since the condition was apparently the malignant sore throat of old writers.

John Blair (A.M.J., May, p. 149), in 1868, describes a case of diphtheria in which xylostyptic ether was successfully employed. He applied this remedy to a case, and the patient at once coughed up a tubular false membrane 3½ in. long, showing the division of the trachea. A print of this, of the actual size, is given. Later in the same year (August, 1868, p. 225) he contributes a further article in which he refers to the increased virulence of the disease during the last few months. There had been 161 deaths in 1867, and 111 for the first six months of 1868. In one of his fatal cases the patient had coughed up a complete mould of the larynx, trachea, and division into the bronchi. On its removal a second membrane had formed, as long as the first. He describes another similar case in which xylostyptic ether, he considered, had helped in the expulsion of the membrane. Eight clinical cases are detailed, and instances of infection are given.

John Day, of Geelong (A.M.J., 1868, p. 266), writes on diphtheria in general. He points out that it first appeared in Melbourne in 1858, almost simultaneously with its appearance in Europe and America, and adds that "the potato-disease, I believe I am correct in stating, appeared almost simultaneously in Ireland and in Tasmania also." He was inclined to think that the disease was very rarely contagious, or altogether non-contagious. In Geelong every severe epidemic of the disease had been preceded by an epidemic of influenza. Various remedies are described.

D. J. Thomas, in the same year (A.M.J., p. 269), writes on some points connected with diphtheria. He points out that it "was not really a new disease." It was important to distinguish croup from diphtheria. In the latter the exudation was easily detached. He gives descriptions of the two diseases, as he considered them, and refers to various forms of treatment, and mentions tracheotomy. In a discussion on this paper before the Medical Society of Victoria a number of medical men took part. Dr. Rudall mentions having had two recoveries out of eleven tracheotomies. In Dr. Thomas's reply he refers to Mr. Girdlestone's question as to whether the exudated material, when transferred to another surface, could produce a similar exudation. "This," he said, "could be positively answered in the affirmative, for no one could have helped seeing it extend to the skin if abraded from contact with exuded material from the fauces." This is the first reference in Australian literature to recognized infection of parts other than the oral cavity.

A. Shaw, also in 1868 (p. 338), details a prolonged case in a child of ten years, in which he attributed ultimate recovery to the absorption of nourishment through the skin. He refers to diphtheria being prevalent in the district whilst scarlatina was absent, showing that the two diseases were distinct.

John Wilkins, of Melbourne, in 1870 (A.M.J., pp. 195, 237, and 264), deals more especially with the local treatment of diphtheria. He refers to cases where wounds and abrasions of the skin are affected. Fourteen months before, he had seen a case with false membrane of the conjunctiva, both under the lids and covering the globe, and encroaching on the cornea to about one-third of its extent. He details the clinical symptoms in general, the records of eighteen cases treated, and the various methods of treatment.

In the same year John Blair writes on "The Treatment of Diphtheria by Tannin" (p. 275, misnumbered p. 295). He had had forty-six cases under his care, and in fifteen of these there had been paralysis of the muscles of the fauces.

In 1871 three papers appeared by James Jamieson, of Warrnambool. In the first (A.M.J., vol. 16, p. 65) he points out that during the last two years cases had been prevalent, but nearly all were around the River Merri—a sluggish stream. He considers that "Though no peculiar specific element could be detected in the morbid products, it by no means follows that no such element exists, since the same can be said also of smallpox." Another paper (p. 97) details "Two Cases of Diphtheritic Croup—Tracheotomy," both of which died; and the third article treats of the "Modern Treatment of Diphtheria," giving details of methods.

It appears from a parliamentary report (A.M.J., 1871, p. 320) that 2,027 deaths from diphtheria had occurred during the last five years in Victoria, 418 in 1870 alone. From 1858 to 1869 (A.M.J., 1872, p. 24) there were 4,575 deaths in Victoria from diphtheria.

In 1872 a Diphtheria Commission was appointed in Victoria (editorial, A.M.J., 1872, p. 24). In the editorial the appointment of this Commission was considered unnecessary, and its personnel was severely attacked, and apparently with some warrant. The report of the Commission ran to 184 pages (A.M.J., August, 1872). In this place the report is adversely criticized. The mortality was variously stated as being from 2 to 60 per cent. Some of the members thought that diphtheria was identical with scarlet fever, and others that sulphurous acid in a gaseous form was considered a specific. Dr. William Thomson wrote a letter criticizing the report. He combats the statements that cases came under notice in Melbourne upwards of twenty years ago; that some very bad cases had been observed in Castlemaine in 1854–55; and that the disease had appeared in Tasmania at an earlier date than in Victoria. The evidence as to cases twenty years before was based on the statement of one witness that he had seen one case in Melbourne at about that period, the child dying twelve hours after being seen. The statement of another witness that he had seen cases in Castlemaine in 1854–55 seemed also to be unfounded.

Dr. John Day also contributes a letter criticizing parts of the report.

Dr. E. S. Hall (A.M.J., 1872) also writes in criticism of the report, pointing out that Tasmania was not the source of the epidemic, and that the disease was unknown there before 1859.

B. C. Hutchinson, in an article on "The Treatment of Diphtheria" (A.M.J., 1872, p. 111), mentions the disease as being present in a severe form in some parts of the colony. His recommendation for treatment consisted chiefly in swabbing with glycerate of carbolic acid (B.P.).

In the middle of 1872 an epidemic of diphtheria appeared at Port Lincoln, South Australia (*Argus*, 22nd July, 1872, quoted by W. Thomson, A.M.J., July, 1872, p. 207). The juvenile population was well-nigh decimated, and Dr. Phillips was sent from Adelaide to investigate. His report was published, and indicated that it was an exceedingly infectious disorder. He traced its introduction into the district to a family that had come overland from the Darling, and followed it from house to house, showing with convincing decision that not in a single instance had it begun spontaneously, and that "one infectious child had contaminated another." The disorder had been present for two or three months previous to this date, and at the time of writing was now abating, partly through having exhausted its victims and partly as a result of the remedies applied under Dr. Phillips's directions.

Thirty deaths occurred in Ballarat during this year (A.M.J., 1873, p. 255).

In 1873 diphtheria was very prevalent in north-west Victoria about May and June, four or five fatal cases occurring in single families. (A.M.J., 1873, p. 191). In Ballarat twenty-four deaths occurred to the end of July, from the beginning of the year.

In the *Australian Medical Journal* of this year several letters and papers appeared on the subject of diphtheria. Thus, John Blair (p. 253) stated that he had exhibited seven specimens of membranous exudate recently before the Medical Society of Victoria. He mentions the good effects of a solution of tannin in sulphuric ether for removing the membrane. He refers to cases reported recently in the *Ararat Advertiser* of the infection of persons who had visited cases—in one case, that of an adult, with a fatal result, the first adult in the district.

John O'Neill (p. 80) dealt with the treatment of diphtheria by iodine vapour; Bunce (p. 135) with treatment by carbolic acid. James Jamieson (p. 304) dealt with "Diphtheria, its Nature and Causes" and (p. 331) "Diphtheria and its Treatment." James Barrett (p. 337) reports details of cases, and James T. Rudall (p. 325) gives "Fragmentary Remarks on some Alleged Remedies for Diphtheria,' on which a discussion followed.

Early in 1874 diphtheria had been prevalent at Castlemaine, Victoria (A.M.J., 1874, p. 138). An outbreak also occurred at Yea, in Victoria. This first began in March, with a fresh outbreak in August and September, and again in October (A.M.J., 1874, p. 312). Four hundred to five hundred deaths were stated in Parliament to have occurred from diphtheria annually for several years past (A.M.J., 1874, p. 253).

In 1877 John Blair (A.M.J., p. 298) deals with "Diphtheria and Diphtheritic Diseases." He gives a summary of papers contributed in 1868, 1870, and 1874, rearranged and extended. During the nineteen years since the epidemic appeared in Victoria 6,802 deaths had occurred.

The first case he had seen was at Merri Creek, in 1858, from which place it gradually spread to the surrounding suburbs, of which he gives details.

Between 1853 and 1877 there were over ten thousand deaths from diphtheria and croup in Victoria.

In 1879 a fatal outbreak of diphtheria occurred at Queanbeyan, New South Wales. This is referred to by W. J. Morton (A.M.G., 1888, p. 227), where he mentions that the cases were successfully treated by chloride of iron in glycerine by Dr. A. Morton.

In the *Australian Medical Journal* of 1880 a number of papers appear dealing with diphtheria. Charles Smith, in a letter (p. 87), considers that croup is a distinct disease from diphtheria. F. Lawton (p. 90), of Lancefield, Victoria, gives the treatment of eighteen cases, four of which were fatal (in two the disease was too far advanced when first seen). John Day (p. 253) recommends strongly a gargle of common salt. He considered diphtheria to be a local disease, and not primarily generalized. An important discussion followed Dr. Day's paper. Mr. Gillbee mentioned that Mr. W. Thomson, of South Yarra, had had considerable success with the application of iodine to the throat. Dr. Girdlestone referred to cases in which a diphtheritic exudation had followed operation on the tonsils when the patients had been exposed to foul air from drains or closets. Dr. Bowen described two cases of diphtheritic ophthalmia. Dr. McMillan stated that he remembered a serious outbreak at Kyneton, where, in some cases, a child was healthy in the morning and dead at night. Out of five tracheotomies, three had recovered. In one house he had seen diphtheria shortly followed by two cases of scarlatina. Dr. Williams referred to severe toxic cases and cases showing paralysis which had had very slight local signs. Dr. Balls-Headley gives details of cases. George Annand (p. 300) describes an outbreak of diphtheria at Hamilton, Victoria. In 1879 he had seen single cases in April, May, and July at Hochkirch, five miles from Hamilton. In Hamilton he had seen two cases in December of that year, five in February, 1880, and two in March. On the 29th March, 1880, a number of persons attended a picnic. From the 2nd April to 15th May fifty cases of diphtheria occurred, of which thirteen died. He had the patients in a tent in the hospital-grounds, and remarks that they seem to have done better than would have been the case in a wooden building, probably due to access of air. In five of the cases abscesses occurred in the neck. He considered diphtheria a local disease. Charles Smith, of Casterton (p. 303), relates the conveyance of the disease by an unaffected person from a diphtheria patient to his own children, who died. Dr. Germyn, of Ballarat (p. 305), stated that he believed the first cases in the western district of Victoria had occurred at Belfast about twenty years before, when three members of one family were attacked, and two died. The disease did not then spread. In April, 1874, he had seen fatal cases at Tower Hill. In January, 1878, at Mapunga, eleven miles from Warrnambool, three cases out of five in one family died. On the 9th April, 1879, he saw a case at Koroit. In June, 1879, he lost his own daughter through the disease. Since his removal to Ballarat he had seen a further fatal case. H. B. Allen (p. 311) gives "Notes on the Pathology of Diphtheria," with results of fourteen cases from the pathological theatre. He relates one case of typhoid fever which developed diphtheria on the thirty-eighth day, and died the following day. At the post-mortem there were typhoid ulcers in the ileum and caecum. James Roberts (p. 347) gives "Notes on the Diagnosis, Pathology, and Treatment of Diphtheria." His paper was a long one, and a number took part in the discussion upon it, during which Mr. A. S. Grey described three cases of diphtheria of the eye. In one the disease had spread from the throat and nose, and the eye was rapidly destroyed. The other two showed a simple membranous conjunctivitis.

1881—New South Wales: An epidemic of diphtheria and croup occurred amongst children at Bourke. The outbreak lasted some time, and several deaths occurred (A.M.G., December).

1882—New South Wales: The disease was present n Tumut, five members of one family dying in seven days (A.M.G., April). It was prevalent at Forbes and at Armidale, with several deaths at the latter place (A.M.G., May).

Victoria: Early in the year, at Merino, a virulent form of throat-affection was reported. This was supposed at first to be diphtheria, and was investigated by Dr. Charles Smith, of Casterton. The disease was then considered to be acute follicular tonsilitis. There were two deaths, one from erosion into an artery (A.M.G., February). A fatal case occurred in Ballarat (A.M.G., February), and two cases were reported at Penshurst at the end of February. It was prevalent in Melbourne, Dandenong, Ballarat East, Fitzroy, Kyneton, and Trencham East (A.M.G., July). Two cases, one fatal, were reported from Warrnambool (A.M.G., September). There was also a mild form present at Kilmore (A.M.G., September). A fatal type was prevalent at Tarraville in South Gippsland (A.M.G., November).

South Australia: The disease was present at Port Lincoln (A.M.G., March). In Adelaide in May five deaths occurred from diphtheria and ten from croup.

Dr. T. Dixson (A.M.G., April, 1882, p. 93) describes a case of diphtheritic conjunctivitis in which the upper lid was much swollen, and there were two bits of grey membrane tightly adherent. The patient recovered.

1883 — Victoria: Several cases occurred at Daylesford (A.M.G., January). The disease had been prevalent for some time at Talbot (A.M.G., March). A virulent form existed at Horsham (A.M.G., May), and it was prevalent at Ballarat East (A.M.G., June). Diphtheria was present in twenty-eight localities (A.M.G., June). A serious outbreak, with a number of deaths, occurred at Carlton, Melbourne (A.M.G., November).

South Australia: The disease was reported at Mount Gambier, with one death (A.M.G., November).

1884—New South Wales: Early in the year some fatal cases occurred at Adelong (A.M.G., April).

Victoria: The disease was present at Coleraine (A.M.G., May), was very prevalent at Dunolly (A.M.G., June), was reported at Donald (with one death), and was present at Greenock Reef (A.M.G., August). An outbreak of diphtheritic croup occurred at Barkstead, and the local State School was closed (A.M.G., September). Diphtheria was prevalent at Edgerton, with two deaths (A.M.G., October).

Queensland: An epidemic of diphtheria with several deaths following on mumps was reported from Ravenswood, North Queensland, by the Rev. Dr. Hunter Finlay (A.M.G., January, 1884, p. 81).

Several deaths occurred amongst children under the care of a local practising chemist, which were certified as croup. Three fatal cases occurred in the epidemic, and seven others were non-fatal.

South Australia: An outbreak of diphtheria and croup was reported from Port Pirie amongst the children, sixty of whom were absent from school in consequence (A.M.G., August).

Tasmania: The disease was present at Leven, with one death (A.M.G., March).

1885—New South Wales: The disease was prevalent at Nyngan (A.M.G., April), and at Quirindi, where there were several deaths (A.M.G., May).

Victoria: An outbreak occurred at Penshurst, with five deaths. The disease was attributed to a swamp in the vicinity of the township. The Central Board of Health decided to recommend to the local Board the use of sulphate of iron, with a view to destroying noxious germs in the swamp (A.M.G., February). A number of cases occurred at Avoca, several of which were fatal (A.M.G., September). Diphtheria was also present at Carlton and East Melbourne (A.M.G., September).

Tasmania: Diphtheria was present at Latrobe (A.M.G., March).

1886—New South Wales: There was an outbreak at Jerilderie, where both the schools were closed (A.M.G., May).

Victoria: Diphtheria was reported as being prevalent at Ballarat East (A.M.G., January).

1887—Victoria: For the year, sixty-four deaths from diphtheria (137 diphtheria and croup) were reported for Melbourne and suburbs. Thirty cases, eighteen fatal, were reported in Victoria for October. It was very prevalent, with five fatal cases, at Ballarat (A.M.G., November), and there was an outbreak at Teraney (A.M.G., December). There was an outbreak at Sandhurst State School in December.

Dr. John Reid, of Melbourne (A.M.G., December, p. 64), contributes a paper on croup and diphtheria. He describes cases, apparently of laryngeal diphtheria, but which he calls croup, which he was of opinion could be distinguished from diphtheria clinically and by chemical tests of the membrane.

1888—Victoria: This year showed an increase in the number of deaths from diphtheria in Victoria, from 199 in 1887 to 301 in 1888, and from "simple and undefined diphtheritic" from 191 to 282. This increase of the disease appears to have begun in December, 1887, as 137 cases were officially reported between the 1st December and the 12th April, of which sixty-five were fatal. Thirty-seven cases were reported in December, 1888, thirteen being fatal. In Greater Melbourne 130 deaths occurred for the year. At Dandenong a virulent type of diphtheria, with three deaths, was reported (A.M.G., May). At the end of the year a severe outbreak occurred at Lang Lang, eighty-five miles from Melbourne (A.M.G., January, 1889).

Queensland: Diphtheria was reported at Hughenden (A.M.G., July).

South Australia: 139 deaths were reported this year from diphtheria, being the highest number since 1867, and representing 0·45 per 1,000 of the mean population. The number of deaths the previous year had only been fifty-nine.

Dr. G. R. Eakins, of Echuca, contributed an article to the *Australasian Medical Gazette* (May, 1888, p. 183) on "The Successful Treatment of Diphtheria." He had treated sixty cases in three years successfully with liq. ferri. perch. fort. and water.

1889—New South Wales: 183 deaths were reported in Sydney and suburbs, the number for the whole State being 288.

Victoria: The increase of fatal cases noted in the previous year was maintained in 1889, the deaths rising from 301 to 530; 572 cases, with 181 deaths, were reported from 1st December, 1888, to 21st May, 1889; 329 deaths occurred in Melbourne and suburbs for the year.

Queensland: In 1889 and the first half of 1890 a considerable number of cases of diphtheria and diphtheritic croup occurred at Charters Towers (Dr. Graham Browne, A.M.G., September, 1890, p. 322). In seventeen cases in which the membrane was marked, three deaths occurred under the turpentine method of treatment.

1890—New South Wales: As an index to the number of cases in the metropolitan area it may be mentioned that forty patients were under treatment at the Children's Hospital, of whom twenty-one died.

Victoria: The number of deaths this year rose from 530 in 1889 to 734 in 1890. This marked increase in Victoria was accompanied by a rise in New South Wales from 288 to 440, and in South Australia from 109 to 174. There was no corresponding increase in Western Australia or Tasmania, whilst the figures for Queensland were not available to us. In Victoria, from the beginning of February to the end of May, the number of cases reported weekly varied from sixty to ninety-six, and the number of deaths from about eight to twenty-five. There were 400 deaths in Melbourne and suburbs for the year. At Numurkah, 133 miles north of Melbourne, twenty-four cases, six fatal, were reported in January. A serious outbreak occurred at Elsternwick (A.M.G., March), and at Albert Park, Melbourne (A.M.G., September).

Tasmania: Twenty-nine cases of diphtheria were treated at the Launceston Hospital in 1890.

In an article on "Diseases amongst Children in Brisbane," Dr. A. Jefferis Turner (A.M.G., December, 1890, p. 67) refers to this disease at the Brisbane Children's Hospital. Fifty deaths were recorded in Brisbane for the first six months of the year. He describes one or two very severe cases, and regrets that he cannot recommend any remedy.

1891—New South Wales: The number of deaths reported for the State only fell slightly, from 440 to 433. In an outbreak at Albert Town, ten miles from Wagga Wagga, seven deaths occurred in one family (A.M.G., May).

Victoria: The number of fatal cases fell from 734 to 326. There were 145 deaths during the year in Greater Melbourne, and thirty-one cases, with eight deaths, in the Ballarat Hospital.

1892—New South Wales: The number of fatal cases fell from 433 to 334 for the whole State. During the year fifty-six cases were treated at the Children's Hospital. On these, thirty-one tracheotomies were done, with one death, and there was one death amongst the simple cases.

Victoria: The number of fatal cases diminished from 326 to 246, and the cases of "simple and undefined diphtheritic" from 170 to 117. This seems to mark the close of the prevalence of diphtheria for the last five years in Victoria. Eighty-eight deaths occurred in Greater Melbourne during the year, and thirty-three cases, with four deaths, were treated at the Ballarat Hospital.

Dr. J. B. Ross contributed a long paper to the *Australasian Medical Gazette* (pp. 178, 215, and 244) on "The so-called Diphtheria Epidemic at Warrnambool." It appears that the number of cases reported from April, 1890, to the end of the year was seventy-nine, and from January to August, 1891, thirty-four; in addition, there were two cases of croup in 1890 and two in January 1891, and one case of diphtheritic croup in March, 1891. Dr. Ross seems to have been of opinion that the outbreak was not really one of diphtheria. He points out that the membrane present was friable and easily removed, and not adherent. The fact, however, that various deaths occurred would seem to indicate that modern bacteriological technique would have revealed the presence of diphtheria bacilli, and that certainly some, if not the majority of the cases, were this disease. Dr. Ross also refers to cases in which paralysis occurred, and states that trustworthy observers had remarked that non-specific throat-disease could be followed by paralytic affections of the soft palate.

Dr. Hardy, in an article on "Diphtheria in Brisbane" (A.M.G., December, 1892, p. 440), deals with the occurrence of diphtheria at various periods of the year. The months of highest mortality between 1887 and 1891 were from April to July, and those of the lowest mortality from October to December. The period of high mortality was concomitant with a low barometric pressure, a low mean temperature, a low mean daily and absolute range of temperature, a high relative humidity with a number of rainy days, and a high amount of cloud. This paper was followed by a discussion.

1893—New South Wales: There is a slight increase in the number of deaths this year—from 334 in 1892 to 422.

Professor T. P. Anderson Stuart (Royal Society of New South Wales, vol. 28, 1894, p. 27) refers to a severe epidemic at Cowra, in which 273 cases, with thirty-six deaths, occurred between November, 1892, and the 16th May, 1893. In every case infection, direct or indirect, could be traced. The general sanitation of the town was very bad.

Victoria: The weekly returns for the beginning of the year showed a decided fall in the number of cases reported, varying from about sixteen to thirty. Thirty-three deaths occurred in Greater Melbourne in the year, and twenty-four cases, with one death, were treated at the Ballarat Hospital.

1894—New South Wales: The mortality returns show a slight fall, from 422 to 355; 137 cases, with sixty-eight deaths, were treated in the Sydney Children's Hospital.

Victoria: The weekly return of cases shows a diminution, as in the previous year. Only four cases were treated in the Ballarat Hospital, with no deaths.

1895—New South Wales: The number of deaths this year was 209, as compared with 355 the year before.

Dr. W. F. Litchfield (Hermes Med. Supplement, Univ. of Syd., Dec. 4, 1895) describes a case of cutaneous diptheria involving the fold of the neck and the groin of a fat child of six months.

This year marks the great epoch in the treatment of diphtheria in Australia. At the beginning of the year the anti-toxin treatment of the disease was inaugurated, and the *Australasian Medical Gazette* is full of a number of papers on the results of this treatment. Dr. Litchfield (A.M.G., March, 1895, p. 98) reported six cases treated at the Sydney Children's Hospital with anti-toxin, one of which was fatal. In the same month (p. 108) Drs. Wilton Love and Ashworth recorded the treatment of cases (six up to the 11th February) with anti-toxin in the Brisbane Children's Hospital, of whom two died. The average mortality for the previous four years in this hospital had been 37·6 per cent., varying from 22·2 to 52·6 per cent. In the June issue (pp. 232 to 242) appear records of cases treated with anti-toxin by Dr. Camac Wilkinson, of Sydney, 2; Dr. P. T. Thane, of Yass, 1; Dr. Springthorpe, of Melbourne, 1; Dr. Fieldstad, of Sydney, 1; Dr. T. E. Abbot, of Hobart, 1; Dr. Irwin, of the Adelaide Children's Hospital, 2; Dr. Litchfield, forty-three, with ten deaths; and Dr. Harvey, of Wentworth, 1. In the July number (pp. 273 and 294) Dr. H. C. Garde, of Maryborough, Queensland, reported six; and Dr. L. M. Ashworth, of the Children's Hospital, sixteen additional cases; whilst a statement made before the Medical Society of Queensland shows that thirty-six cases have been treated at the Brisbane Children's Hospital, with eight deaths. In this discussion before the Medical Society of Queensland, Dr. Love mentions a case in which three weeks after injection of the serum there were joint-pains, with swelling and an extensive papular rash, and he asks whether this condition is due to the serum or whether the case was one of dengue. In an editorial in the *Australasian Medical Gazette* on "The Anti-toxin Treatment of Diphtheria" (August, p. 342) a summary is made of one hundred reports by various writers of cases treated with anti-toxin published in this journal during the six months from February to July. Dr. W. F. Litchfield (pp. 355 to 394) contributed a paper on "Some Clinical Observations on Diphtheria." Dr. C. L. Handcock (p. 440) and Dr. W. Camac Wilkinson (p. 441) also detailed cases treated successfully with anti-toxin, whilst Dr. T. Borthwick, of Adelaide (p. 448), wrote on "Diphtheria and its Treatment by Anti-toxin Serum" in general terms.

1896—Victoria: Twenty-three cases, with no deaths, were treated in the Ballarat Hospital for the year. Diphtheria was present in the Shire of Kilmore (A.M.G., August).

Tasmania: One hundred and ten cases were reported during the year, with fourteen deaths. In February, 1896, an epidemic broke out in Hobart, when there were forty-five cases and nine deaths (A.M.G., January, 1897, p. 53). Infection was traced to the milk supplied by one of the dairies. Towards the end of the year an outbreak was also reported in a family at Beaconsfield (A.M.G., January, 1897).

Drs. C. P. B. Clubbe and W. F. Litchfield (A.M.G., February, 1896, p. 39) give "A Short Account of the First One Hundred Cases of Diphtheria treated at the Diphtheria Branch of the Sydney Children's Hospital with Anti-toxin, in Comparison with the One Hundred Preceding Cases treated without." The mortality of all the cases of diphtheria (tracheotomies included, of which there were fifty-nine in the first untreated series and forty-eight in the second) was reduced from 51 per cent. to 23 per cent. As showing the virulence of diphtheria at this date, it may be pointed out that nearly half the cases required tracheotomy. This is in marked contrast to the type of disease prevalent during the last few years in Australia, even if the modifying effect of the anti-toxin treatment be taken into consideration. Dr. H. Russell Nolan, of Sydney, records a very severe case which recovered unexpectedly under anti-toxin treatment. Dr. T. Borthwick, of Adelaide (A.M.G., June, p. 219), gives "A Preliminary Note on the Bacteriology and Anti-toxin Treatment of Diphtheria," in which mention is made of anti-toxin rashes.

1897—Victoria: There were nineteen cases, with three deaths, in the Ballarat Hospital for the year.

1898—Victoria: At the beginning of the year there was a slight increase in the number of cases notified for the whole State. The disease was prevalent in Melbourne (A.M.G., April). Eleven cases, with one death, were treated in the Ballarat Hospital for 1898.

Tasmania: Twelve cases were reported from Tasmania, with one death in Hobart, for the year. The disease was prevalent at Ulverstone (A.M.G., November).

Western Australia: During this year 124 cases, with six deaths, were treated in the various hospitals (Dr. Cumpston, A.M.G., 1908, p. 354), compared with forty-three cases and six deaths the year before, and twelve with no deaths in 1899; thirty-four deaths were recorded in the State, as against twenty-six in 1897 and seven in 1899.

1899—Victoria: Seventy-two cases were treated in the Ballarat Hospital, with one death, for the year.

Dr. R. H. Ritchie (I.M.J., July, p. 348) contributes a paper entitled "Remarks on the Epidemic of Diphtheria, with Special Reference to Anti-toxin Treatment." This deals with 106 cases, of whom two died, occurring in Horsham from July, 1898, to the end of June, 1899. The general trend of symptoms seems to have been mild, though there were some cases where there was sudden onset, with a rigor and temperature of 104°. There were two cases of paralysis. Anti-toxin was freely given.

Dr. A. Jefferis Turner (*Intercolonial Medical Journal*, vol. 4, 1899, p. 585) deals with the treatment of diphtheria based on the records of the Brisbane Children's Hospital for ten years, five and a half of which were previous to the anti-toxin treatment. His figures show a great improvement after the introduction of anti-toxin. Dr. Turner also contributed a paper to the Intercolonial Medical Congress, 1899 (Fifth Session, p. 458), on "The Diphtheria Mortality of the Three Principal Australian Colonies for the past Fifteen Years, with Special Reference to the Influence of Anti-toxin on the Death-rate." He gives tables for Queensland, New South Wales, and Victoria. In the pre-anti-toxin period (1884 to 1889) the death-rate in each of the three States varied from about 43 to 49 per cent., and in the second pre-anti-toxin period (from 1890 to 1894) it varied from about 40 to 47·7 per cent. In the anti-toxin period since then the death-rate had fallen to from between 16·4 to 19·7 per cent. He points out that Queensland and New South Wales show no great decline in the death-rate in the two pre-anti-toxin periods dealt with, whilst Victoria did show a decline following the epidemic of 1889 and 1890. With the introduction of anti-toxin there was a remarkable fall attributable to this treatment.

1900—New South Wales: In Sydney this year only three deaths were recorded, in May.

Victoria: The deaths in Melbourne during March, April, and May were very low, varying from two to ten. Ballarat had one death in March and one in April.

Queensland: The deaths in Brisbane during March, April, and May varied from one to four.

Tasmania: One death occurred in Hobart, in March.

R. Scott (A.M.G., November, p. 479) gives a paper introducing a discussion on diphtheria. This deals with the anti-toxin treatment, &c.

1901—New South Wales: There was a slight increase in diphtheria during this year, compared with the previous one. In Sydney and suburbs in June sixty-six cases, with twelve deaths, occurred, and six cases, with one death, in Newcastle.

1902—New South Wales: At West Maitland early in May there were thirteen cases, but no deaths.

Victoria: The disease was present at Ballarat (A.M.G., January).

Western Australia: Seventy-three cases were notified, with nine deaths.

1903—New South Wales: Dr. W. F. Litchfield (A.M.G., 1903, p. 357) describes a case of diphtheritic intertrigo, in a female child of ten months; there was a severe intertrigo, with a whitish-grey membrane in the groins. Diphtheria bacilli were cultivated from this. There were no general symptoms or throat-affection.

In this same year Dr. E. S. Stokes, of Sydney (A.M.G., October, p. 482) reported upon "An Outbreak of Diphtheria and Sore Throat, due to Milk contaminated by Persons showing no Clinical Manifestations of either Condition." The cases had occurred from the 7th to 23rd October, 1902. There had been forty-nine cases of diphtheria and sixty-five of sore throat. Forty-six of the former and all of the latter were connected with the milk-supply of one dairyman. There were fifty-eight cases in seventeen houses, none of which could with certainty be regarded as secondary. Diphtheria bacilli were found in fourteen out of eighteen cases of diphtheria, and in two out of eight of sore throat. The epidemic seemed clearly traceable to the milk, there being a small incidence in those households supplied from the infected dairy who had boiled their milk. Diphtheria bacilli were found in the throat of the dairyman's wife and an employee. The organism obtained from the latter killed guinea-pigs. Dr. Stokes says in summing up, "In conclusion, it appears evident that the epidemic resulted from the contamination of A's milk by the bacilli of diphtheria, derived from the throats of one or two persons on the farm, who themselves presented no indication of suffering, or having recently suffered, from diphtheria." The mortality was low, being under 6 per cent. for the cases of diphtheria and 2·7 per cent. for the whole group of cases. This is certainly the first Australian instance in which carrier cases were definitely recognized.

Western Australia: There were eighty-one notifications and twenty-two deaths.

1904—Victoria: Diphtheria was very prevalent in Goornong, Yearnmouth, Newstead, Rochester, and Wedderburn (A.M.G., July).

Western Australia: The number of notifications was 177, and deaths forty.

1905—Victoria: An epidemic of twenty-eight cases, with one death, lasting six weeks, appeared at Oaklands in the beginning of January.

Western Australia: There were 228 notifications and thirty-nine deaths.

1906—Western Australia: 317 cases were notified, with sixty-five deaths.

1907—Victoria: In the middle of the year the disease was said to be very prevalent, over thirty cases being reported each week.

Western Australia: There were 879 notifications and sixty-nine deaths.

In 1907 the *Intercolonial Medical Journal* (p. 545) gives an editorial entitled "Diphtheria: A Retrospect." This goes back to records of 1859, 1860, and onwards, which we have already discussed.

1908—Western Australia: For some years the number of cases in this State had been steadily increasing. This year numerous scattered country towns and villages developed cases. These were also numerous in Perth and suburbs; and near the middle of the year Kalgoorlie, Boulder, and Coolgardie were affected. The outbreak at Boulder was described by Dr. R. A. Parker (A.M.G., December, p. 670). A special hospital was opened, and seventy-three cases were treated between the 20th April and the 17th June. There were four deaths. A large number of swabbings were taken from school-children, and 120 carrier cases located by the bacteriological laboratory of the Public Health Department. Dr. Cumpston (A.M.G., July, p. 352) writes of diphtheria in Western Australia, describing the various factors at work in its increase in the State, and giving the number of cases in hospitals since 1896. He shows that school attendance did not increase the number of notifications. During this year the bacteriological department of the Health Department made extensive examinations of swabbings from the throats of school-children, which resulted in the detection of a large number of carrier cases.

Dr. W. G. Armstrong, Medical Officer of Health to the Metropolitan Combined Districts, Sydney (A.M.G., July, p. 350), details an outbreak of diphtheria in the suburbs of Sydney involving forty cases, thirty-four of which were supplied by two dairies. Several carrier cases were found at one dairy. One of these individuals had for a few days been employed at the other dairy, and this apparently accounted for the cases (five) which occurred in connection with the the second dairy run. The connection with the distribution of milk seems exceptionally clear in this case.

1909—Victoria: Drs. C. V. Mackay and R. A. O'Brien (I.M.J., p. 67) contributed a paper entitled "Report of 404 Cases of Diphtheria in the Infectious-diseases Hospital, Fairfield, Melbourne." The mortality was 4 per cent. The paper is worthy of consultation, giving an excellent summary of the treatment and results at this hospital.

DEATHS FROM DIPHTHERIA, CROUP, AND QUINSY IN THE VARIOUS STATES OF AUSTRALIA FROM 1856 TO 1912.

(Queensland is not included, as only deaths in institutions are available, except for the years 1909–12.)

Year.	New South Wales.			Victoria.			South Australia.			Western Australia.			Tasmania.		
	Diphtheria.	Croup.	Sore Throat, Quinsy.	Diphtheria.	Croup.	Quinsy.	Diphtheria.	Croup.	Quinsy.	Diphtheria.	Croup.	Quinsy.	Diphtheria.	Croup.	Sore Throat. Quinsy.
1856	..	..	..	..	69	..	..	14	..	..	..	..	..	..	..
1857	..	..	..	..	56	..	..	31	1	..	..	..	..	..	..
1858	..	..	..	6	102	..	..	64	15	..	..	..	..	..	..
1859	..	..	..	280	229	..	72	73	3	..	..	..	..	..	..
1860	..	..	..	636	156	..	106	71	8	..	..	..	..	..	..
1861	..	..	..	510	166	46	66	75	5	..	..	..	..	..	..
1862	..	..	..	360	134	36	89	26	2	..	..	..	..	..	..
1863	..	..	..	331	136	65	105	35	..	..	..	..	..	..	..
1864	..	..	..	451	160	22	107	44	..	..	..	..	..	..	..
1865	..	..	..	391	171	16	108	44	..	..	..	..	..	..	..
1866	..	..	..	331	132	23	36	30	..	..	..	..	..	..	..
1867	..	..	..	334	115	23	168	72	2	..	..	..	..	..	..
1868	..	..	..	451	194	20	106	67	3	..	..	..	11	28	2
1869	..	..	..	493	162	12	69	56	1	..	..	..	14	8	2
1870	..	..	..	418	99	15	116	40	1	..	..	..	15	22	2
1871	..	..	..	255	90	10	68	43	3	..	..	..	5	11	..
1872	..	..	..	320	121	18	105	61	4	7	*	..	1	11	..
1873	..	..	..	420	142	24	61	44	5	10	..	..	28	15	1
1874	..	..	..	375	159	17	71	61	8	18	..	..	36	22	5
1875	165	127	..	239	135	11	74	49	1	..	7	..	54	21	5
1876	204	163	..	201	173	15	48	54	6	..	9	..	37	20	4
1877	205	220	..	359	315	14	30	34	2	2	7	1	72	14	4
1878	253	252	..	336	331	26	76	53	3	4	3	..	59	11	1
1879	284	207	..	337	275	14	82	86	3†	1	3	..	61	18	3
1880	163	126	..	198	156	4	93	83	13	4	2	2	90	13	4
1881	132	125	..	114	126‡	6§	58	65	5	..	1	..	24	23	1
1882	175	173	..	122	142	10	67	99	4	1	1	1	17	18	1
1883	235	229	..	131	167	10	49	108	1	21	4	1	10	16	..
1884	165	160	..	165	181	9	111	85	3	5	18	..	22	29	..

* Included with diphtheria.

† In 1879 the heading was changed to "Sore Throat, Quinsy."

‡ In 1881 heading altered to "Simple and Undefined Diphtheritic."

§ In 1881 heading altered to "Sore Throat, Quinsy."

DEATHS FROM DIPHTHERIA, CROUP, AND QUINSY IN THE VARIOUS STATES OF AUSTRALIA FROM 1856 TO 1912—*continued.*

(Queensland is not included, as only deaths in institutions are available, except for the years 1909–12)—*continued.*

Year.	New South Wales.			Victoria.			South Australia.			Western Australia.			Tasmania.		
	Diphtheria.	Croup.	Sore Throat, Quinsy.	Diphtheria.	Croup.	Quinsy.	Diphtheria.	Croup.	Quinsy.	Diphtheria.	Croup.	Quinsy.	Diphtheria.	Croup.	Sore Throat, Quinsy.
1885	298	284	..	152	180	7	102	86	2	1	7	2	23	27	1
1886	140	129	..	121	160	15	89	28	10	5	4	2	12	22	3
1887	217	206	21	199	191	16	59	28	3	4	12	1	35	20	2
1888	240	210	21	301	282	9	139	40	5	3	7	1	43	20	4
1889	288	206	12	530	279	17	109	39	5	4	11	3	43	26	2
1890	440	209	19	734	299	13	174	47	5	3	11	..	49	..	3
1891	433	220	20	326	170	11	173	50	3	3	14	2	21	19	6
1892	334	124	10	246	117	2	106	33	5	7	21	..	69	34	1
1893	422	156	20	120	62	3	100	30	3	8	13	2	50	19	2
1894	355	109	15	169	56	2	97	16	8	8	11	..	44	17	..
1895	209	74	11	133	63	5	37	16	5	12	5	..	24	12	2
1896	168	79	10	121	53	7	21	4	6	9	5	..	14	7	2
1897	143	30	9	263	56	13	22	12	2	26	9	3	12	7	..
1898	169	86	13	212	35	7	38	14	6	34	7	2	10	4	3
1899	60	39	12	141	37	7	40	9	6	7	4	..	19	8	2
1900	63	25	16	155	18	6	32	6	2	3	1	..	10	3	1
1901	131	28	9	147	26	10	19	3	3	10	1	1	16	1	1
1902	74	26	17	104	22	22	27	8	1	8	1	..	3	3	2*
1903	134	29	17	100	16	19	21	4	6	18	3	3	9	3	..
1904	156	31	5	190	18	12	18	4	6	35	5	3	4	1	2
1905	102	13	13	80	8	5	7	7	5	35	4	3	10	2	4
1906	100	10	10†	50	8	7	12	4	3	59	6	3	4	..	1
1907	133	14	12†	90	‡	..	15	‡	..	64	5	..	8	..	3
1908	123	17	19†	111	‡	..	11	‡	..	106	5	..	11	1	1
1909	166	19	15†	89	‡	..	18	‡	..	75	6	..	11	1	..
1910	207	26	11†	112	‡	..	46	‡	..	62§	7	..	11	1	..
1911	226	11	..	..	..	..	65	‡	..	36§	1	..	16	3	3
1912	253	13	..	..	..	..	58	‡	..	28§	7	..	17	..	..

* In 1902 heading altered to "Quinsy, Tonsilitis."

† Included under diseases of the pharynx.

‡ Included with diphtheria.

§ And croup.

II. Acute Anterior Poliomyelitis.

The history of acute anterior poliomyelitis in Australia in epidemic form shows an interesting parallelism with the history of the disease in other countries. Known for many years in its sporadic form, the symptom-complex of which was first clearly defined by Heine in 1840, there are no records of outbreaks of the disease in epidemic form until 1880. The history of the disease in Scandinavia, where it first occurred in epidemic form, is worth quoting: " Assuming that earlier epidemics had not occurred unnoticed, a gradual increase is found from 1880 onwards in Scandinavia. At first only small groups of cases, some in families, were noticed; then small epidemic outbreaks; later, a true epidemic in Sweden in 1887; still later, a larger epidemic in both countries in 1899; and finally a big epidemic over a great part of Scandinavia in 1905" (Römer, "Epidemic Infantile Paralysis," 1913, p. 127). In other European countries and also in America the history of the disease is exactly similar.

In all probability sporadic cases have been known to occur for a considerable time in Australia. Many authors, in describing subsequent epidemics, mention the occurrence of sporadic cases, but no records of these exist in the medical journals. On the other hand, records of cases of Landry's paralysis are not uncommon. Römer, following Wickman, points out that cases analogous to Landry's paralysis occur during epidemics of anterior poliomyelitis, and considers that most cases of Landry's paralysis occurring in sporadic form are cases of anterior poliomyelitis which have resulted in a fatal issue. The basis of this type (Römer, *loc. cit.*, p. 18) is a "poliomyelitis acutissima," beginning in the centres of the lower limbs, spreading rapidly to those of the upper limbs, and leading to a fatal issue in a few days by involving the centres in the medulla.

For the above reasons, cases of Landry's paralysis have been included in the present revision.

It will be noticed that following the occurrence of sporadic cases there was a small outbreak in epidemic form at Port Lincoln in 1895; a more extensive epidemic in 1903 and 1904, involving practically the whole of Australia; and a further epidemic in Victoria in 1908. The last epidemic was a small outbreak on the northern rivers of New South Wales in 1909.

1887.—In this year Dr. Jarvie Hood reported a case of Landry's paralysis occurring at Maclean, on the Clarence River, New South Wales (A.M.G., October, 1887, p. 1). The patient, a girl of nine, was affected with a rapid ascending paralysis, but ultimately made a perfect recovery. The electrical reactions were normal all through, and there was no wasting of the muscles.

1890.—In this year Dr. Crago (A.M.G., 1890, October, p. 19), recorded a case of acute ascending paralysis of Landry occurring in a young man of nineteen years. Death took place on the seventh day after an ascending paralysis which, starting in the lower limbs, spread upwards, ultimately causing death by suffocation. In the discussion which followed, Dr. Scot Skirving referred to Dr. Hood's case, and to two other cases—one where the patient died in forty-six hours after a rapid ascending paralysis, and one where the paralysis was more gradual, and where the patient recovered, the diagnosis of the latter case being obscured by the question of hysteria.

1893.—In this year what appears to have been a small family outbreak at Port Macquarie, in New South Wales, is described by Dr. E. S. Stokes (A.M.G., 1893, p. 34). The first case was a patient of twenty-six, who died after three days' illness, the legs becoming paralysed twenty-four hours before death. The second case occurred in a brother aged twenty, who was away from home, but returned after his brother's death. He did not come into contact with the body, and returned to his work, eight miles away, on the day of the funeral. Two days later he became ill, and died in two days from asphyxia, the intercostals becoming paralysed. Two weeks previously a boy of ten years in the same house had been affected with a mild form, involving the legs slightly and the right arm. Recovery in this case was practically complete. Dr. Stokes mentioned that the water-supply came from a stream which ran through a bed containing a considerable amount of arsenic, but says that the illness presented none of the symptoms of arsenic-poisoning.

1895.—In this year the first recorded outbreak of the disease in epidemic form occurred at Port Lincoln, South Australia (C. A. Altmann, A.M.G., 1897, p. 173). Fourteen cases occurred, all during the months of March and April. Previous to this outbreak there had been no cases since 1887, when a sporadic case occurred. Fairly extensive notes are given on each of the cases. The outbreak appears to have been of the typical spinal type in almost all, with a history of a febrile onset followed at varying intervals by paralysis affecting, in the majority of cases, the lower limbs. One, a case of hemiplegia, is recorded with affection of the left facial nerve. The proportion of sexes affected was eight males to six females, and with one exception all the cases were over three years of age, the oldest being twenty-six. In two instances two members of the same family were attacked in rapid succession. The author refers to what he terms a "remarkable coincidence, if nothing more." The District Council issued instructions that during March and April simultaneous efforts were to be made for the destruction of rabbits, the method adopted consisting chiefly in laying phosphorized pollard. In all except two of the houses where the cases occurred phosphorus had been used. Several cases of acute phosphorus-poisoning of a mild form also occurred at the same time. There were no deaths, but in most of the cases, though there was considerable improvement, there was also some permanent weakness or paralysis left.

1901.—Dr. A. Jeffreys Wood, Melbourne, recorded (*Intercolonial Medical Journal*, 1901, p. 221), a case of infantile paralysis affecting the left leg, and also causing partial paralysis of the external rectus muscle of the left eye.

1903–4.—The next outbreak of this disease started in Sydney in the summer of 1903–4, and extended throughout the greater part of New South Wales, Queensland, Victoria, and South Australia. A number of papers appeared in the medical journals dealing in particular with cases in New South Wales and Queensland, though mention is also made of the occurrence of the disease in Victoria and South Australia.

Dr. R. B. Wade, of Sydney (A.M.G., 1904, p. 346), records thirty-four cases, sixteen males and eighteen females, most of them between the ages of eighteen months and two years and a half. The onset was sudden in the majority of cases, and in two occurred during the course of other diseases. Paralysis followed at a varying interval, the affected parts being chiefly the extensors of the lower limbs. Dr. Wade's cases occurred during December and January, and there were no deaths. The same author also contributed a paper dealing with this epidemic to the Australian Medical Congress, Melbourne, 1908 (vol. 3, p. 48). In this paper the author reviewed the general symptomatology, onset, and type of paralysis in comparison with sporadic cases. In regard to the type of paralysis, he says that the legs were affected in 94 per cent., the muscles supplied by the cranial nerves in 2 per cent., the erector spinae in 10 per cent., and the abdominal muscles in one case. In the sporadic form initial symptoms were less severe and the tenderness less marked. In other particulars the two forms did not differ materially.

Dr. W. Litchfield, of Sydney (A.M.G., 1904, p. 346), recorded thirty-five cases from November, 1903, to March, 1904, twenty-one of which occurred in December and January. While there was a typical history of sudden onset in most, he notes that in some paralysis came on without introduction or accompaniment. He mentions that this summer was wetter and cooler than usual.

In July, 1904, Dr. Blackett, of Queanbeyan, New South Wales (A.M.G., July, 1904, p. 347), described an epidemic of polyneuritis which had lately appeared in Queanbeyan. From the notes of the cases contributed there is little doubt that they were cases of infantile paralysis. Six cases occurred during two months. The initial symptoms—onset and the distribution of paralysis—corresponded with other series, although the extensors of the arms appeared to be most affected in these cases. Two cases were sisters and two others cousins.

In the same journal (*loc. cit.*, p. 348), Dr. Earle Page described a case of acute ascending paralysis which occurred at Grafton, New South Wales, in March. The case was fatal in 108 hours, after a rapid ascending paralysis extending from the lower parts of the body to the upper, death resulting from paralysis of the respiratory centre.

In August, 1904 (*loc. cit.*, p. 426), Dr. John McPherson, of Young, New South Wales, recorded eight cases which occurred in that district from the end of December, 1903, to the beginning of March, 1904, one case occurring about the middle of May. He notes in one case the appearance of a pink blotchy eruption. One death occurred from broncho-pneumonia when recovering from paralysis.

Dr. E. A. Falkiner contributed a paper (A.M.G., October, 1904, p. 506) dealing mainly with the pathology of the late epidemic, and suggested that the disease was a variety of cerebro-spinal meningitis caused by the same specific organism. He states that, following the Sydney epidemic, cases occurred in Armidale and Glen Innes, in New South Wales, and reached Toowoomba, in Queensland, in April. He described two cases in which meningeal symptoms were pronounced —one case developed a blotchy rash, the other cases were of the typical spinal type. He mentions that in Taree the epidemic was described as cerebro-spinal meningitis, and in Albury as purpuric fever.

A paper by Dr. Burnett Ham (A.M.G., 1905, p. 193) refers to the widespread epidemic in Queensland during 1904. One hundred and eight cases were reported as due to anterior poliomyelitis, four of which were reported as fatal. The incidence of the disease was heaviest on infants from two to four years. In his paper he contrasts the disease with cerebro-spinal meningitis, an epidemic of which occurred during the same year. The epidemic spread from the southern border of the State in a northerly direction. Cases were reported from Toowoomba, Ipswich, Brisbane and suburbs, Maryborough, and Townsville. In the discussion (*loc. cit.*, p. 223) Dr. Bourne gives notes of cases admitted to the Children's Hospital. She states that the epidemic began in July and ended in February, being worst in October.

In 1908 Dr. A. Jefferis Turner, of Brisbane (A.M.G., p. 120), contributed notes on a case which occurred during the 1904 epidemic in Brisbane, and which simulated meningitis at the onset, but developed typical infantile paralysis. He reported the result of tendon implantation in the case.

1905.—Dr. A. S. Joske, of Prahran, Victoria (A.M.G., November, 1905, p. 590), reported a case of Landry's paralysis in a youth of sixteen, ending in recovery, improvement taking place after five weeks. Dr. W. S. Byrne, of Brisbane (A.M.G., 1905, p. 679), reported a case of Landry's paralysis in a man aged thirty-five. The paralysis affected the upper limbs and spread upwards, at no time affecting the legs. Death took place in forty-eight hours.

1908.—In this year an extensive epidemic occurred in Victoria during the months of April, May, and June. Dr. H. Douglas Stephens (Australasian Medical Congress, Melbourne, 1908, vol. 3, p. 42) records 135 cases. The majority of cases occurred in children living in the most densely populated suburbs around Melbourne. There was no apparent relationship between this epidemic and the undue prevalence or absence of other diseases. The outbreak supervened after an excessively dry warm summer, with a dearth of water in the catchment area such as had not been experienced for many years. The cranial nerves were affected in a number of cases, and in one case the cerebellum appeared to be chiefly affected. In some instances the condition was closely analogous to Landry's paralysis. The symptoms and onset of paralysis were typical of the disease. The author states that he came across much evidence bearing on the question of contagion. Six deaths occurred, approximating to 4·5 per cent. The questions of pathology and bacteriology, and symptomatology and treatment, are gone into at some considerable length in this paper.

In the proceedings of the same Congress, Dr. William McKenzie contributed a paper on "The Treatment of Infantile Paralysis" (*loc. cit.*, p. 55).

1909.—In the *Intercolonial Medical Journal* of this year (p. 110) reference is made to "the recent epidemic of acute anterior poliomyelitis in Bendigo," which was discussed at a meeting of the Bendigo Medical Society on the 28th January. Dr. Green contributed notes on two cases (published in the I.M.J., April, 1909, p. 197) which ended fatally. In one case there were marked meningeal symptoms at the onset, and in the other the condition was complicated by pneumonia.

In the same journal Dr. W. McKenzie (p. 250) contributed a paper on "The Immediate Treatment of Infantile Paralysis of the Upper Limbs."

Reference was made by Dr. Macdonald Gill, in a paper on "Infantile Paralysis" (A.M.G., June, 1910, p. 285), to an epidemic in Sydney in March, 1909. He met with twelve cases, but no deaths. In December of the same year he states that three fatal cases of acute encephalitis were admitted to the Children's Hospital, and also a typical case of infantile paralysis and one doubtful one. At the end of 1909 a small epidemic occurred on the Richmond and Tweed Rivers. Dr. Sanderson, Government Medical Officer for the district (quoted in the *Australasian Medical Gazette,* 1909, p. 620), reported that the epidemic started on the 12th September. There were twenty cases in the district, but no deaths. Dr. Willis, Assistant Government Medical Officer, was sent up to investigate, and reported (A.M.G., 1909, p. 671) that sixteen cases had occurred at Ballina, five cases at Broadwater with one death, and two at Murwillumbah. All the cases at Ballina and four of the Broadwater cases had visited a certain fruit-shop at Ballina, while the fifth case at Broadwater had received fruit from the same shop. Apparently there was no connection between the Murwillumbah cases and those on the Richmond.

In the annual report of the Department of Public Health, Tasmania, 1908–9, mention is made by Dr. J. S. C. Elkington of a number of cases which had occurred in various districts during March, 1909. Returns of forty-one cases were received during the ensuing three months; there were five deaths.

1910.—Two papers appeared in the *Australasian Medical Gazette* of this year on infantile paralysis—one by Dr. Gordon Craig (*loc. cit.*, p. 287), in which he refers to the recent work done in the disease; the other by Dr. Max Herz (p. 288) on "The Surgical Treatment of Infantile Paralysis." The paper by Dr. Macdonald Gill noted above appeared in the same issue; and in the discussion that followed Dr. Willis gave further references to the epidemic investigated on the Richmond in 1909.

1912.—In the annual report of the Department of Public Health, Tasmania, 1911–12, an account is given by Dr. Purdy, Chief Health Officer, of a few cases which occurred in Tasmania, where the disease was first made notifiable in January, 1912. Three cases were reported from the Upper Huon, one from Ellendale, and one from Queenstown. Investigation showed that there had been at least twelve other cases at the Upper Huon.

The disease was made notifiable in New South Wales in 1912.

In answer to inquiries the Secretary of the Royal Alexandra Hospital for Children very kindly submitted a record of cases of infantile paralysis which had been admitted to that hospital since the year 1891. In his letter he states, "In answer to your telephonic communication, I have pleasure in forwarding you on the attached form particulars with regard to the admission of cases of infantile paralysis to this institution from the year 1891. You will notice that in some of the years there are no cases recorded; evidently the Registrar has included them in 'Other Diseases of the Nervous System.' It might be stated that the great increase from 1909 up to the end of 1913 is explained by the fact that the hospital was removed from the Glebe to the present buildings at Camperdown. The hospital at the Glebe, you will remember, was a very small place, only capable of accommodating fifty-five cots, while in our present hospital we have accommodation for 182 cots."

Record of Cases of Infant Paralysis admitted to the Royal Alexandra Hospital for Children, Camperdown, Sydney.

Year.	Admitted.	Died.
1891	4	..
1892	6	..
1893	3	..
1894	9	..
1895	7	..
1896	4	..
1897	..	..
1898	..	..
1899	..	..
1900	1	..
1901	2	..
1902	5	..
1903	..	..
1904	..	..
1905	..	..
1906	..	..
1907	2	..
1908	..	..
1909	29	..
1910	22	1
1911	16	..
1912	46	..
1913	50	..
Totals	206	1

The list is of interest, as it is in some measure a reflex of the proportion of cases which occurred—at any rate, in the city and suburban areas.

We are indebted to Dr. J. S. Purdy, City Health Officer, for the following record of cases notified in the metropolitan area of Sydney during the year 1912. Dr. Purdy says,—

"I have gone through the cards recording the notifications of poliomyelitis for the past two years, and summarized the data as far as the metropolitan area is concerned. The chief features noticeable is that the cases were quite sporadic, and that we had no second cases in the same house.

"*Anterior Poliomyelitis within the Metropolitan Area of Sydney.*

"There were twenty-eight cases of poliomyelitis notified from within the metropolitan area during the year 1912, the first year during which the disease was notifiable, distributed throughout the following months: February, two cases; March, four cases; April, four cases; May, two cases; August, six cases; September, three cases; October, one case; November, two cases; December, four cases.

"There were twelve females and seventeen males attacked. Seven of the cases were notified from the City of Sydney, the remainder being from sixteen other municipalities within the metropolitan area.

"Under age groups, one case was between six and twelve months, seven cases were one year, ten cases were two years, eight cases were three years, two cases were five years.

"There were thirty-two cases of anterior poliomyelitis notified from within the metropolitan area during 1913, distributed throughout the following months: January, eight cases; February, five cases; March, six cases; April, four cases; May, four cases; June, two cases; August, two cases; September, one case.

"As showing the sporadic nature of the distribution, the thirty-two cases were scattered over twenty-four municipalities. There were thirteen females and nineteen males attacked. There were five cases in Petersham, the greatest number in any one municipality, all reported in different months.

"Under age groups, two cases were between six and twelve months, five cases were one year, ten cases were two years, eight cases were three years, four cases were four years, one case was six years, one case was eleven years, one case was twelve years.

"There were no reports of more than one case from the same house."

RETURN SHOWING CASES OF INFANTILE PARALYSIS NOTIFIED AS EXISTING IN THE STATE OF NEW SOUTH WALES DURING THE PERIOD 1ST FEBRUARY, 1912, TO 31ST JANUARY, 1914.

Metropolitan Combined Districts.

Date of Notification.	Onset of Illness.	Patient.	Sex.	Age.		Address.
				Yrs.	mos.	
1/3/12	21/2/12	F. McG.	M.	1	6	Sydney.
8/3/12	20/2/12	E. H.	M.	1	9	,,
8/5/12	29/4/12	A. S.	M.	3	0	,,
10/6/12	25/3/12	J. N.	M.	1	8	Newtown.
10/6/12	21/5/12	P. H.	F.	0	5	Glebe.
10/6/12	22/5/12	D. P.	M.	3	0	Balmain.
10/6/12	22/5/12	B. T.	F.	0	11	,,
10/6/12	6/5/12	G. J.	M.	1	7	Annandale.
10/6/12	1/5/12	A. P.	F.	2	0	Alexandria.
10/6/12	20/5/12	G. P.	M.	2	0	,,
10/6/12	5/5/12	J. C.	M.	3	0	Woollahra.
10/6/12	15/4/12	P. H.	M.	2	6	Redfern.
7/7/12	29/6/12	D. B.	F.	0	7	Vauclause.
19/8/12	..	K. H.	F.	2	0	Mascot.
19/8/12	29/7/12	G. S.	M.	2	0	Mosman.
19/8/12	..	F. S.	F.	5	0	Hurstville.
19/8/12	..	D. C.	F.	3	0	Glebe.
28/8/12	20/8/12	B. L.	F.	1	6	Sydney.
24/9/12	..	M. R.	F.	1	2	,,
1/10/12	26/9/12	A. H.	M.	2	0	,,
11/11/12	9/10/12	V. W.	F.	1	11	St. Peters.
20/11/12	..	E. L.	F.	1	8	Sydney.
9/12/12	29/9/12	R. A.	M.	3	9	,,
23/12/12	30/11/12	G. L.	M.	2	7	Rookwood.
23/12/12	..	K. C.	F.	2	2	,,
9/12/12	14/11/12	C. M.	M.	3	0	Newtown.
23/12/12	18/11/12	A. B.	M.	3	0	Marrickville.
16/1/13	..	W. G.	M.	4	6	,,
16/1/13	..	A. S.	F.	4	0	Petersham.
16/1/13	..	L. J.	F.	3	6	Dulwich Hill.
23/1/13	11/1/13	C. S.	M.	2	9	Waverley.
24/1/13	..	D. M.	M.	2	0	Strathfield.
28/1/13	21/1/13	W. C.	M.	2	0	Randwick.
28/1/13	15/1/13	A. C.	F.	3	0	Rockdale.
26/1/13	19/1/13	C. T. H.	M.	3	0	Erskineville.
24/2/13	19/1/13	L. R.	M.	2	0	Hunter's Hill.
20/2/13	..	R. H.	F.	2	3	Sydney.
17/2/13	10/2/13	E. M.	F.	4	5	Lewisham.
20/2/13	4/2/13	L. McC.	M.	3	4	Paddington.
12/2/13	9/2/13	N. L.	F.	4	0	Gladesville.
24/3/13	..	O. P.	F.	2	0	Sydney.
24/3/13	..	E. P.	F.	1	3	Woollahra.
24/3/13	18/3/13	A. J.	F.	1	8	Leichardt.
5/3/13	24/2/13	E. S.	M.	1	3	Surrey Hills.
25/3/13	6/3/13	M. R. F.	F.	2	3	Glebe.
25/3/13	..	F. J. B.	M.	6	0	Waverley.
4/4/13	..	A. McK.	F.	3	0	Kogarah.
7/4/13	29/3/13	R. M.	M.	3	0	Petersham.
12/4/13	25/3/13	V. S.	M.	2	6	Newtown.
19/4/13	..	J. S.	F.	12	0	Fairfield.
27/5/13	3/4/13	J. H.	M.	3	0	Willoughby.
8/5/13	..	V. S.*	F.	0	7	Balmain.
7/5/13	19/4/13	G. W.	F.	0	10	Bankstown.
26/5/13	28/5/13	M. S.	F.	11	0	Ryde.
26/6/13	..	W. H.	F.	2	0	Petersham.
15/8/13	11/8/13	E. C.	F.	1	10	Redfern.
20/8/13	4/8/13	H. L.	M.	1	2	Annandale.
19/9/13	20/8/13	E. D.	F.	3	5	St. Peters.
26/1/14	19/1/14	W. F.	M.	2	0	Chatswood.

* Died 8/5/13.

Return showing Cases of Infantile Paralysis notified as existing in the State of New South Wales during the Period 1st February, 1912, to 31st January, 1914—*continued.*

Date of Notification.	Onset of Illness.	Patient.	Sex.	Age.		Address.
				Yrs.	mos.	
Remainder of State.						
10/6/12	6/3/12	W. G.	F.	2	0	Tumut.
10/6/12	19/4/12	A. S.	M.	3	0	Penrith.
10/6/12	19/5/12	R. C.	F.	2	0	,,
24/6/12	..	J. D.	M.	2	0	Wellington.
8/5/12	13/6/12	D. B.	F.	0	10	Tumut.
19/8/12	..	H. S.	F.	2	7	Blue Mountain S.
19/12/12	..	C. M.	M.	1	9	Bulli.
23/12/12	..	C. G.	M.	2	6	Moree.
4/2/13	24/1/13	E. D.	M.	4	0	Tumbarumba.
26/2/13	4/2/13	R. S.	F.	1	3	Shellharbour.
28/2/13	21/12/13	A. H.	M.	3	2	Goodrabigbee S.
8/3/13	..	M. B.	F.	6	0	Coonamble.
25/3/12	18/3/13	— B.	F.	2	0	Central Illawarra.
4/4/13	..	D. J.	F.	1	8	Forbes.
15/4/13	21/3/13	M. H.	F.	5	0	Severn S.
26/4/13	9/4/13	M. M.	M.	4	0	Wellington.
27/6/13	20/6/13	F. M.	M.	2	10	,,
30/6/13	..	— McD.	F.	2	8	Cobbora S.
15/10/13	..	E. B. I.	F.	0	6	Wellington.

III. Cerebro-spinal Meningitis.

This disease was first described by Vieusseux, who reported a small outbreak in Geneva in 1805.

In his "Geographical Pathology," Hirst divides the outbreaks into four periods—from 1805 to 1830, in which the disease was most prevalent throughout the United States of America ; the second period, from 1837 to 1850, when the disease prevailed extensively in France, and there were a few outbreaks in the United States ; the third period, from 1854, when there were outbreaks in Europe and several extensive epidemics in America ; and the fourth period (Osler, "The Principles and Practice of Medicine," p. 108), from 1875 to the present time, in which the disease has broken out in many regions, while during the past twenty years there have been localized outbreaks in many lands. All the recorded occurrences of the disease in Australia would come within this fourth period. "Cerebro-spinal fever occurs in epidemic and sporadic forms (Osler, *loc. cit.*, p. 109). . . . The epidemics are localized, occurring in certain regions, and are rarely very widespread. The disease is not highly contagious, and is probably not transmitted by the clothing nor the excretions. Sporadic cerebro-spinal fever occurs in all civilized countries. The disease lingers indefinitely after an outbreak, and in all large cities a moderate number of cases occur every year. . . . The meningitis in children, known as the simple or posterior basic, is a sporadic form." The above references by Osler apply equally well to the occurrence of the disease in Australia.

In 1877 Weichselbaum described the organism *Diplococcus intracelluris meningitidis*, which was probably the same as one previously found by Leichenstern.

In Australia the first record of the disease is a report by Dr. H. N. MacLaurin (*New South Wales Medical Gazette*, vol. 4, 1873–74, p. 109) of two cases occurring in September, 1873, one being fatal. In this case a post-mortem examination showed thickening of the arachnoid along the left fissure and a quantity of serous fluid in the left lateral and fourth ventricles.

In the same journal (*loc. cit.*, p. 111) Dr. Milford recorded a case occurring in December, 1873, in which death took place on the fifteenth day of the disease. He states that in early life the patient had suffered from a spinal affection, but had been free from it for many years.

1882.—Dr. J. P. Ryan (*Australian Medical Journal*, vol. 4, 1882, p. 542) records a case in July of that year, death taking place on the eleventh day. He states that the sudden onset—shivering, headache, vomiting without nausea, lightning pains in abdomen and legs, stiffness of muscles, inflammatory changes in ear and eye, vesicular eruption on skin associated with febrile temperature and running an acute course—was so marked and peculiar as to be pathognomic of the disease. In the discussion Dr. James Robertson thought that the case was not one of cerebro-spinal fever, "It might rather be called meningitis specially affecting the base of the brain and the spinal cord. Simple idiopathic meningitis might cause similar symptoms, such as fever, headache, giddiness, and vomiting, though there was generally more mental disturbance than was noted in Dr. Ryan's patient." The patient had suffered from spinal curvature. Dr. Robertson thought it possible that the disease was really tubercular meningitis. Dr. Girdlestone thought the history was not conclusive. In his response Dr. Ryan referred to isolated cases occurring in other countries.

1883.—Dr. R. D. Pinnock, of Ballarat Hospital, reported a case of cerebro-spinal fever (A.M.G., March, 1883), which he at first intended calling petechial fever, until he had seen the report of Dr. Ryan's case. The patient was thirteen and a half years old. There was a petechial eruption, protracted head, the knees were drawn up, and there was muttering delirium and occasional short crying. The patient recovered, becoming convalescent in twenty days. In March, 1880, he saw similar symptoms in a girl of eleven, and in June in a man. Dr. Henry doubted whether the case had been one of cerebro-spinal fever; all the cases he had seen had died.

1887–88.—A paper entitled "Clinical Notes on some Cases of Cerebro-spinal Fever," by Dr. W. Finley, of Bathurst (Intercolonial Medical Congress, 2nd session, Melbourne, 1889, p. 139), records five cases met with in that district. Three males and two females were affected, the ages varying from seven to twenty-seven. The last case was aborted, and Dr. Finley regarded it as a sample of a large number of cases which had occurred in his practice during the previous fifteen months, and which he considered could properly be classified as aborted cases of cerebro-spinal fever. In all the cases there was a rash, generally a shotty eruption on the arms and legs, only extending as high as the elbows and knees, and followed later on by a dusky mottling of the skin over the same area. In one case there was a petechial rash all over the body except the palms and soles.

1891.—Dr. George E. Rennie recorded (A.M.G., 1892, p. 175) notes of two fatal cases that occurred in Sydney Hospital in July, 1891. The cases occurred in men aged fifty-seven and thirty-two years respectively; in both there was a history of injury, though the post-mortem examination failed to show any injury or disease in the skull or spinal column that could have been a source of septic mischief. In both cases pus was present in the subarachnoid spaces. No bacteriological examination was made.

1897.—Dr. A. Jefferis Turner, of Brisbane (A.M.G., July, 1897, p. 354), recorded a case of meningitis in which the *Diplococcus intracelluris meningitidis* of Weichselbaum was isolated from the meningeal exudate at the post-mortem. The case was evidently one of tonsilitis complicated by pneumonia, which after a very short interval of apparent convalescence was followed by meningitis, which proved fatal.

1898.—Dr. Sinclair Gillies, of Sydney (A.M.G., 1898, p. 470), contributed notes on three cases of epidemic cerebro-spinal meningitis. He notes the previous records of this disease, the earliest being recorded by Dr. MacLaurin in the *New South Wales Medical Gazette* for 1873. Three cases with two deaths were then described. Dr. Milford, in the same journal, recorded a doubtful case, as did Dr. J. P. Ryan in the *Australian Medical Journal* for 1882. Dr. Holden recorded a sporadic case in 1884 (A.M.J.), and Dr. Finley's cases in 1889, Dr. Rennie's in 1892, and Dr. Jefferis Turner's in 1897 are also mentioned. Amongst his own cases, Dr. Sinclair Gillies records that three cases occurred in the one household in quick succession. Full notes of the cases are given. All were rapidly fatal, the duration of illness being from five to seven days. In two haemorrhagic eruption appeared; in one joint-swellings occurred, and in this case Gram positive *Diplococci* were obtained from a swelling on the back of the right wrist. The *Meningococcus* was not found, but Dr. Isbister found *Diplococci* in a swabbing from the throat of one of the cases; this *Diplococcus* was not identified. The author discusses the diagnosis, and refers to the bacteriological findings of the disease in other countries.

1899.—Dr. John McPherson, of Glen Innes (A.M.G., 1899, p. 483), described a case occurring in September, 1899, which ended fatally. No autopsy was permitted, but an exploratory needle was inserted into the spinal canal, the cranial cavity, and the middle ear, with negative results.

1900.—Dr. Sinclair Gillies (A.M.G., 1900, p. 56) recorded notes on a case in a girl of sixteen, who died six weeks after onset of illness. Lumbar-puncture showed the presence of *Meningococci*. In the post-mortem the pia mater at the base of the brain was found to be much thickened and matted together, completely enclosing the foramen of Majendie, death being due to hydrocephalus.

In the report of the Health Officer for the City of Sydney (Dr. Cyril E. Corlette) for 1900 (A.M.G., 1901, p. 80) two fatal cases are recorded as occurring in December, 1900.

1901.—One of us (J. B. C.) recorded a case of cerebro-spinal meningitis in the Prince Alfred Hospital of four months' duration. The patient, a man of thirty-three years, ultimately died. Lumbar-puncture gave no result. Post-mortem showed slightly turbid or semi-purulent cerebro-spinal fluid, and the lateral ventricles were dilated. Associated with the disease was swelling of the joints and septic parotitis. There was no really distinctive or diagnostic sign of meningitis until near the end.

A nephew of the patient living in the same house died two days after admission of the first case to the hospital.

Dr. Sinclair Gillies (A.M.G., 1909, p. 367) gave notes on sixteen cases of cerebro-spinal meningitis treated at Prince Alfred Hospital between July, 1900, and February, 1901. These formed part of an epidemic which occurred in Sydney during that time. There was one case in July, two in August, four in September, four in October, three in November, one in January, 1901, and one in February. The ages varied from five months to forty-three years; thirteen males and three females were affected. The cases came from all parts of the city and suburbs; two were from the same house, and two from contiguous streets. There were eleven deaths, forming 69 per cent. of the cases. Comparative notes of the symptoms are given in fifteen of these cases. Lumbar-puncture was performed twelve times; post-mortems were performed on seven of the cases. In five of the cases *Meningococci* were discovered either in the lumbar-puncture or at the post-mortem.

An outbreak of the disease in epidemic form occurred at Port Pirie, in South Australia (A.M.G., 1901, p. 390). Twelve deaths occurred, principally amongst school-children in various parts of the town. Few adults were affected. One or two cases which had occurred at Adelaide were suspected to have originated at Port Pirie. A *Diplococcus* was isolated in one of the cases.

Dr. Hampden Carr (A.M.G., 1901, p. 467) recorded four cases, three of which were fatal. A post-mortem was performed on one. He mentions that two of the cases were sisters, and that the second one was removed to the house of a friend; two children afterwards took the disease in this house, and both died.

Dr. R. W. Stewart, of Port Pirie (A.M.G., 1901, p. 468), gives notes on four cases, three of which were fatal. Post-mortem was performed on one case; there was no increase in the cerebro-spinal fluid, though both brain and cord were congested and soft. He mentioned two other fatal cases.

1902.—Dr. Jarvie Hood (I.M.C., Hobart, 6th session, 1902, p. 158) recorded notes on cases seen during a recent epidemic in Sydney. He gave notes of three cases seen in his private practice from March to August, 1900, and of seven cases admitted to his beds at the Sydney Hospital—six in October, 1900, and one in 1901. In his cases there were three males and four females, with four deaths. Three cases were admitted under Dr. Jenkins, of which one died; two under Dr. Dixon, both fatal; six cases under Dr. Jamieson, all fatal. In his own cases the *Meningococcus* was isolated from two cases; post-mortems were performed on five out of six of Dr. Jamieson's cases, the exudate in all showing the *Meningococcus*. Thus, eighteen cases were admitted between September, 1900, and October, 1901, of which fifteen died; there were fifteen males and three females, and the ages were from two and a half to forty-three years. The author was supplied by Dr. J. McPherson with brief notes of four cases, all fatal, which occurred at Glen Innes in 1899 and 1900; and one case, also fatal, of Dr. Herschel Harris, in September, 1901. In the discussion Dr. Officer mentioned that in Melbourne a number of cases had been reported, and that he had seen four cases in private practice. Dr. Jamieson, of Sydney, said that Dr. Wright, one of the oldest practitioners in Sydney, had informed him that some twenty-five years ago an outbreak occurred in a part of Sydney known as "The Rocks." Dr. Wright's description of the disease left no doubt in his mind that the disease in reality was cerebro-spinal meningitis. Dr. Verco stated that he had seen several cases.

During the first month of this year ten deaths occurred in South Australia from cerebro-spinal meningitis (A.M.G., 1902, p. 597). Several cases occurred among the workmen at the Bundaleer Water-works.

In a pamphlet entitled "Epidemic Cerebro-spinal Meningitis (Cerebro-spinal Fever) in South Australia, 1908," Dr. Ramsay Smith, permanent head of the Department of Public Health of South Australia, gives an account of the various epidemics that have occurred in that State. He quotes from letters received from Dr. Stewart and Dr. Hamilton, of Port Pirie, giving notes of cases that had occurred with them. Notes are also given of a number of cases which Dr. Ramsay Smith had seen at the Adelaide Hospital at varying times from 1896 to 1898, in which post-mortem examination showed the presence of meningitis; also the detailed history of a girl of seven years whose case was mentioned in the daily papers. This last case was admitted to the hospital in September, 1901, and eventually recovered. Dr. Ramsay Smith gives notes on two patients seen in consultation with Dr. Lynch in October, 1902. In September, 1901, he reported on the Port Pirie outbreak, and states that the disease was the epidemic form of cerebro-spinal meningitis, and was first noticed in the middle of July or the beginning of August. About the 20th August it assumed the nature of an epidemic, and at the beginning of September gave cause for alarm. It affected children and adults up to about thirty years of age. He comments rather adversely on the sanitary arrangements of the town. Notes on eleven cases (one of which the diagnosis was doubtful), four recovered cases, and four pneumonic cases are given. In October, 1902, Dr. Aitken, of Jamestown, reported to the Resident Engineer at the Bundaleer Water-works that five cases of cerebro-spinal meningitis had been admitted to the Jamestown Hospital. Dr. Ramsay Smith visited Bundaleer in October, 1902, and in his report states that several cases had occurred—about six in all—amongst the workmen at Bundaleer, the majority being at the fresh-water camp. In November a further visit was made, and in the interval one fatal case had occurred. Dr. Ramsay Smith gives notes on nine cases from the district, five of which were fatal. He states that Dr. Otto W. Smith, of Clare, had had a fatal case in the Clare district, and that other cases had occurred at the same locality, the disease having been noticed in that district as long as nine months previously. On the 17th November he reported that there were seven cases in Jamestown Hospital, three from Bundaleer and four local ones. A trained nurse was sent up from Adelaide, but she developed the disease and died. The disease was made notifiable in the *Government Medical Gazette* of the 27th November, 1902. Tables are given of the deaths from cerebro-spinal fever which occurred from 1901 to 1907, from which the following are abstracted: 1901, twenty-one deaths; 1902, twenty-one deaths; 1903, eight deaths; 1904, four deaths; 1905, one death; 1906, one death; 1907, four deaths. Tables are also given showing an abstract of the cases reported since October, 1902: 1902, five cases; 1903, eight cases; 1904, nine cases; 1905, four cases; 1906, three cases; 1907, four cases.

1904.—Dr. Burnett Ham, in his paper on infantile paralysis (A.M.G., 1905, p. 193), compared that disease with an epidemic of cerebro-spinal meningitis which occurred in Queensland during 1904. Twenty-three cases were reported up to the 20th December as cerebro-spinal meningitis, of which five died. The heaviest incidence was in children from three to five years old, the age mortality being greatest in those of five years. A comparison of the clinical pictures of the two diseases is given.

1905.—Dr. George Cuscaden, of Melbourne (A.M.G., August, 1906, p. 398), recorded a case of cerebro-spinal meningitis occurring in October, 1905. Death took place on the fifth day. In the discussion Dr. Jamieson (*loc. cit.*, p. 408) mentioned three cases which occurred about three or four years previously at the Alfred Hospital. Looking back he said that he recognized that the disease had existed in Melbourne twenty years ago, but on account of the sparseness of cases its specific character had been overlooked.

1907.—Two cases were reported (A.M.G., 1907, p. 204) as occurring in Melbourne. One died some time after discharge from the hospital.

1909.—Mention is made (A.M.G., p. 52) that several cases had occurred in Brisbane, two proving fatal.

A CONTRIBUTION TO THE QUESTION OF DIPHTHERIA AND ITS RELATIONSHIP TO DIPHTHERIA-BACILLUS CARRIERS.

By J. Burton Cleland, M.D., Ch.M.,

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The Microbiological Laboratory of the Department of Public Health conducts examinations for diphtheria bacilli of all swabbings submitted by medical men, medical officers of schools, Government medical officers, &c. It also necessarily undertakes the examination of large series of swabbings in connection with any epidemic investigated by other officers of the Department of Public Health. During the year 1913, in addition to the ordinary routine swabbings from actual or suspected cases, the prevalence of diphtheria in various parts of the suburbs and in the country necessitated the examination of large numbers of swabbings from school-children. Further, in the middle of February cases of diphtheria appeared on the training-ship H.M.A.S "Tingira." This last-named outbreak has proved of very great interest, and has necessitated the examination by this Department of over 3,300 swabbings during the year. The outbreak may be considered as a typical institutional one, in contradistinction to the ordinary school epidemic, where children return home at night.

A brief outline may be given of the work conducted by the laboratory into this epidemic, which work was chiefly confined to the first six months of the year, as owing to the outbreak of smallpox in Sydney early in July we were unable to undertake such systematic work, when, however, Professor Welsh, of the University of Sydney, kindly came forward and took our place. Some of the boys were later drafted to Melbourne, and the necessary swabbings were there made by Dr. Bull, of Melbourne University. On the 14th February one of the boys on the training-ship took ill with diphtheria, of which he died. On the 19th February two further cases occurred. Another appeared on the 20th March, and one on the 25th March. Sixteen appeared in April and sixteen in May, twelve in June, six in July, five in August, and two in September. After the appearance of the second and third cases in February the whole ship's company was swabbed on the 21st and 22nd February, when ten carriers were detected and isolated. Swabbings of the whole ship's company were repeated on six occasions up to the beginning of July. After each swabbing the positive cases were isolated, and were not readmitted to the ship until two or more completely negative swabbings had been taken. The attached tables indicate the dates of occurrence of actual cases of diphtheria, and the days on which swabbings were made, and the number of swabbings in each case positive. In this latter table the large numbers indicate swabbings of the whole ship's company, the smaller numbers indicate reswabbings of carriers or of cases showing more or less suspicious organisms. At the beginning of the epidemic an attempt was made to isolate cases on board ship. This was difficult to carry out, and an excellent move was inaugurated when the lads were sent to the Quarantine Station at North Head. They were divided there into three classes—those which were negative, those which harboured suspicious organisms but not unquestionable diphtheria baccilli, and those harbouring morphologically typical Klebs-Loeffler bacilli. The three groups were housed in separate parts of the reserve, and were provided with different coloured bands on their arms, so as to prevent intermixing. Unfortunately, just when this scheme seemed to be working well the Quarantine Station was required for smallpox, and the cases had to be hurriedly removed. Dr. Brennand, the Staff Surgeon in charge, by his energy and administrative ability, obtained a suitable building near Rose Bay to harbour the carrier cases. There from time to time the various positive or suspicious cases were removed; and those which had been positive, but had yielded one or more negative results, were isolated from their still positive fellows. In spite of these efforts cases continued to appear on board the ship. Interesting in this connection is a swabbing taken of the whole ship's company on the 30th April; two of the lads found negative then were removed to hospital with definite diphtheria two days later—on the 2nd May.

After this Department had ceased its active examination of swabbings it was decided that the ship should be cleared out, that the negative cases should be despatched to Melbourne, and that the carriers should be removed to Milson Island, on the Hawkesbury River. Still, even these measures did not absolutely control the disease, since two cases occurred amongst the boys in Melbourne and further cases amongst the few remaining on board. At first sight it might be thought the enormous amount of bacteriological work done, and the strenuous efforts made to limit the outbreak, proved absolutely ineffectual; but it must be looked at from this point of view: Had these carrier cases not been detected and isolated the epidemic might have assumed still more serious proportions than it did. From the experience gained in this epidemic the following points seem worthy of note:—

(1.) The close herding together of a large number of boys on board ship gave, from their propinquity to each other, admirable means for the conveyance of the organism from one to another.

(2.) In a few instances cases which had been carriers for some weeks, though they had shown no evidence then of the disease, have, after being negative for a number of weeks, later on developed the disease. Whether during this apparently negative period they were still harbouring the organism somewhere in the naso-pharynx which later on assumed virulence, or whether the actual attack was due to a reinfection with a virulent form of the bacillus, cannot be determined. The fact seems obvious, however, that the carrier phase produced no protection against the disease.

(3.) Some cases proved to be carriers for many weeks, and yet have never actually suffered from the disease. Several instances of this occurred amongst the officers, in one of which a relative of the individual developed the disease in a slight form. As diphtheria was present in the suburb in which this person lived, it is possible that the strain responsible for the disease was not the same as that carried by the relative on board ship. On the other hand, infection from the ship seems more likely.

(4.) Removal on frequent occasions of apparently all the carrier cases did not prevent subsequent cases amongst the negatives, in some instances within two days of such negative findings.

(5.) The return of the carrier cases, which had been negative on two or more occasions, to the ship was not followed by any excessive outbursts of diphtheria.

(6.) Nevertheless, in subsequent swabbings from the ship's company these previously carrier cases more frequently appeared amongst the new positives than was to be expected had they been true negatives.

(7.) The number of the positive carrier cases seemed related in some way to the type of weather prevalent. More cases were found during cold and wet weather than under sunny conditions. Whether this was mere coincidence, or meteorological conditions favoured dissemination of the bacilli amongst individuals or its spread to parts of the throat more accessible to a swabbing, is hard to say.

(8.) Throughout the epidemic it has been our custom to examine the cultures made at the end of twenty-four hours and again in forty-eight hours. In this way the amount of work was doubled, but a large number of cases were detected which would otherwise have been missed.

Attached to this paper is a further appendix indicating the number of swabbings of school-children undertaken by the laboratory during 1913 on behalf of Dr. Willis, the Chief Medical Officer of Schools. The number of swabbings taken indicate the number of children attending a whole school or particular classes on the day in question. A study of these will show considerable variations in the number of positive cases detected. Thus the percentage may vary from under 4 per cent. to about 24 per cent. In only one instance, when only thirteen children were examined, there were no definite positive cases detected. In all instances there had, of course, been actual cases of the disease in some way connected with the school, so that carrier cases somewhere amongst the healthy children were to be almost certainly expected. The large variation in the percentage found infected is probably to be explained as indicating, in the case of a low percentage, the recent arrival of the disease in the community, and, in the case of the higher percentages, its firm establishment there. Unquestionably the separation of such infected children must play some part in controlling the spread of the disease. The importance of their detection is necessarily much greater when the disease has but recently reached the locality, as it offers in this case a method of stamping it out. Where the positive cases are large in number the chance of curtailing the epidemic is lessened, as there are probably a number of other carriers, often amongst adults, which escape detection. Nevertheless, the finding of the bacilli from particular children's throats must put the families concerned on their guard, and is also a great help to the attending family physicians should any other member of the household manifest symptoms of a sore throat.

APPENDIX A.—Sequence of Cases of Diphtheria occurring on or in Connection with H.M.A.S. "Tingira."

		Date.
Case 1.	(A. B.)	14/2/13
,, 2.	(J. W.)	19/2/13
,, 3.	(C. H.)	19/2/13
,, 4.	(H. C. A.)	20/3/13
,, 5.	(J. A. M.)	25/3/13
,, 6.	(P.)	1/4/13
,, 7.	(W.)	2/4/13
,, 8.	(R. D.)	2/4/13
,, 9.	(A. F.)	6/4/13
,, 10.	(F. C.)	17/4/13
,, 11.	(W.)	21/4/13
,, 12.	(R. C.)	24/4/13
,, 13.	(De C.)	26/4/13
,, 14.	(A. B. C.)	26/4/13
,, 15.	(L. D.)	28/4/13
,, 16.	(L. H.)	28/4/13
,, 17.	(R. C.)	28/4/13
,, 18.	(J. G. B.)	28/4/13
,, 19.	(H.)	28/4/13
,, 20.	(R. C.)	29/4/13
,, 21.	(P.)	30/4/13
,, 22.	(C. M.)	1/5/13
,, 23.	(G. B.)	2/5/13
,, 24.	(H. Y.)	2/5/13
,, 25.	(J. C.)	6/5/13
,, 26.	(W. W. F.)	8/5/13
,, 27.	(R. W.)	9/5/13
,, 28.	(R. F.)	12/5/13
,, 29.	(D. R.)	12/5/13
,, 30.	(C. F. S.)	13/5/13
,, 31.	(H. K.)	15/5/13
,, 32.	(O. C. W.)	15/5/13
Case 33.	(G. P.)	21/5/13
,, 34.	(A.)	22/5/13
,, 35.	(W. R.)	27/5/13
,, 36.	(B.)	27/5/13
,, 37.	(R.)	30/5/13
,, 38.	(McM.)	4/6/13
,, 39.	(R.)	5/6/13
,, 40.	(C. S. A.)	7/6/13
,, 41.	(C.)	13/6/13
,, 42.	(C.)	13/6/13
,, 43.	(G.)	15/6/13
,, 44.	(C.)	21/6/13
,, 45.	(C.)	22/6/13
,, 46.	(S.)	23/6/13
,, 47.	(M.)	23/6/13
,, 48.	(W.)	30/6/13
,, 49.	(E. C.)	30/6/13
,, 50.	(H.)	3/7/13
,, 51.	(T.)	7/7/13
,, 52.	(H.)	12/7/13
,, 53.	(N.)	16/7/13
,, 54.	(M.)	20/7/13
,, 55.	(R.)	30/7/13
,, 56.	(B.)	3/8/13
,, 57.	(B.)	6/8/13
,, 58.	(K. V.)	6/8/13
,, 59.	(T.)	7/8/13
,, 60.	(I. V.)	10/8/13
,, 61.	(M.)	29/9/13
,, 62.	(W.)	29/9/13
,, 63.	(R.)	1/12/13

APPENDIX B.—Lists of Swabbings examined from H.M.A.S. "Tingira" by the Microbiological Laboratory.

Date.	Number of Swabs. submitted.	Number Positive.	Date.	Number of Swabs. submitted.	Number Positive.
1913.			1913.		
Feb. 21	321	10	May 17	2	..
,, 22	8	..	,, 19	30	..
,, 24	11	..	,, 22	1	..
,, 26	53	..	,, 23	44	..
,, 27	3	..	,, 29	47	..
Mar. 1	57	..	,, 31	1	..
,, 5	57	..	June 2	1	..
,, 10	30	..	,, 4	43	..
,, 12	25	..	,, 6	1	..
,, 19	30	..	,, 10	23	..
,, 27	20	..	,, 11	1	..
,, 31	309	14	,, 13	3	..
April 1	4	..	,, 17	19	..
,, 2	10	..	,, 24	332	32
,, 3	25	..	,, 25	2	..
,, 4	271	14	,, 28	1	..
,, 10	67	..	,, 30	66	..
,, 11	250	2	July 4	1	..
,, 12	17	..	,, 7	41	..
,, 16	37	..	Aug. 5	1	..
,, 17	292	12	,, 7	3	..
,, 21	89	10	Dec. 22	1	..
,, 22	5	..	,, 29	2	..
,, 23	1	..			
,, 28	63	..		3,358	
,, 29	56	..	1914.		
,, 30	210	0	Jan. 5	2	..
May 5	38	..	,, 7	46	..
,, 7	50	..	,, 9	1	..
,, 12	36	..	,, 15	2	..
,, 15	246	15	,, 22	2	..

APPENDIX C.—Lists of Swabbings of School-children.

Date.	Number of Swabbings.	Number of Swabbings Positive.
23/4/13	28	1 (2 with diphtheroids).
3/5/13	79	19 (8 with diphtheroids, 7 with suspicious bacilli).
14/5/13	127	12 (9 with suspicious bacilli).
16/5/13	22	2.
4/6/13	38	6 (6 with suspicious bacilli).
6/6/13	43	7 (3 with suspicious bacilli).
11/6/13	67	10.
17/6/13	61	12.
17/6/13	21	1.
24/6/13	73	13.
1/7/13	109	13.
7/7/13	138	7.
7/8/13	42	3 (4 with diphtheroids).
16/9/13	13	0 (2 with diphtheroids).
23/9/13	19	1.
26/9/13	24	4 (2 with diphtheroids).
30/9/13	30	5 (3 with diphtheroids).
1/10/13	18	5 (1 with diphtheroids, 2 with suspicious bacilli).

SECTION OF SURGERY.

PRESIDENTIAL ADDRESS IN THE SECTION OF SURGERY.

By R. Hamilton Russell, F.R.C.S. (Eng.),
Senior Surgeon to the Alfred Hospital, Melbourne.

Lister: The Laboratory and the Bedside.

Mr. President and gentlemen,—My gratitude for the very high honour that has come upon me in the invitation to fill the presidential chair in this important section of Congress is both deep and sincere.

The interval that has elapsed since we last met in session has witnessed the turning of a page of unexampled progress and fruitfulness in the history of surgery. The maker of modern surgery has passed from among us, having bequeathed to us a splendid heritage for us to employ as best we may. Much has been written and spoken during the months that have passed about the work and personality of Lord Lister by men who have enjoyed the privilege of intimate association with him, and it would seem that there is good reason why I should make more than a passing allusion to him; for am I not warranted in thinking (if I may be permitted without sacrifice of decorum to obtrude an observation of a nature purely personal to myself) that one incidental but direct result of the teaching of Lister may be discovered in the honour you have done me in setting me in this place? I myself am conscious that it is so, and I rejoice in the knowledge that whatever you have found of worthiness in me, I may ascribe to his influence, his teaching, and his example, and offer it as the only tribute it is in my power to offer to his beloved and honoured memory.

My thoughts revert to the time, now some thirty-five years ago, when I first entered the wards of King's College Hospital as a student under Lister, and began to learn that the making and the dressing of wounds was to be studied as one of the fine arts. It is customary nowadays to contrast what is called the antiseptic methods of Lister with the aseptic methods of the present day, with the more or less tacit implication that there is not merely a difference in method, but in the principle involved.

There seems to be a prevalent idea that the difference is to be found in the fact that whereas Lister was in the habit of applying strong chemical antiseptics to his operation wounds, we have made a great advance in protecting wounds from the injurious contact of antiseptics. So we have —but I must point out that this is an improvement in our methods only, and it became possible when it was proved that air-borne micro-organisms are not to be feared as the cause of wound-infection. Prior to this critical discovery, it was clearly impossible to prevent whatever antiseptic agent was being used to purify the air from coming into contact also with the wound; but this was quite recognized by Lister as an evil from which, however, in the state of his knowledge as it then existed, there could in the nature of things be no escape. Nevertheless, his desire constantly expressed, to protect the wound as far as possible from the contact of antiseptic substances, was noteworthy; the spray was kept at as great a distance from the wound as possible, consistently with what appeared to be efficiency, and an impermeable layer of varnished oiled silk was placed immediately on the wound to protect it from the irritation of the dressing; and when in the early "eighties" Lister had convinced himself that the carbolic spray was unnecessary he was prompt to abandon its use gladly; and from the abandonment by Lister himself of the spray, we may date the birth of modern aseptic methods.

It is, I imagine, needless for me to observe that my sole object in making these observations is to be found in the interests of historical accuracy. No one would even conceive the thought, when we speak of the great advances that we have made in building up our modern aseptic methods upon the antiseptic methods of Lister, that any derogation from our vast indebtedness to him is conveyed or suggested thereby. What always does occur to me, however, and must be vividly before the view of anybody who knew intimately the working of Lister's mind, is that the contributions that We (with a capital W) have made independently of him towards the establishment of present-day surgical methods do not, after all, amount to quite so much as we are prone to think. The matter may not appear to be of so much importance as I seem to attach to it, but a mildly cold douche administered to our self-sufficiency is never unwholesome, and I am tempted to venture on another. The transition from the antiseptic methods as practised by Lister to the aseptic present-day methods has not been altogether unattended by loss. It does not present a picture of unqualified progress all along the line, in my humble opinion. There is no doubt that the belief prevailing in the days of my studentship—that the air was a prime source of danger to wounds, and that the access of a puff of air unpurified by the carbolic spray was a source of grave risk to the patient's safety—faulty as we now know it to have been, nevertheless made for the most extraordinary precision and skill in the application of surgical dressings. It is a common observance of mine to my students that the fine art of surgical dressing has died out with our simpler modern methods; not that I deplore the loss of a ritual which we now know to have been bacteriologically unnecessary, but that splendid unnecessary ritual carried with it much that was incidentally of real advantage to the patient. For one thing, the dressing had to be so applied that it would remain in place without shifting a hair's breadth for a week if necessary; and the close study of methods of precision designed to accomplish this purpose led quite naturally to the incidental attainment of means to further the comfort of the patient, so that the dressing of a wound by Lister became a very beautiful and complete artistic procedure. I well remember a distinguished visitor, after watching Lister do a dressing, remarking, "The great physician Graves desired that on his tombstone should be inscribed the legend, 'He fed fevers'; I would suggest for your epitaph, 'He dressed wounds.'" With all our vaunted advances and improvements, wounds are not dressed nowadays so beautifully as he was wont to dress them; it is quite true that in the vast majority of cases the need for such precision does not exist, for most of our wounds that are not already infected we are able to close without drainage, and in neither case is the antiseptic or aseptic dressing of such supreme importance. Nevertheless it not rarely happens that the exigencies of a special case make urgent demands for accuracy and confidence in our methods of antiseptic dressing of the kind that Lister practised and taught; and lo, they are forgotten. While I am on this subject I cannot forbear to tell a story that used to be told to successive generations of students, always with bated breath and in the strictest confidence. I am not aware that the confidence has ever been broken, but I venture to break it now, for I judge that the passage of years has rendered it permissible for me to do so. The antiseptic dressings, as some of us remember, used to be fixed in position by means of elastic webbing, applied in a prescribed manner, fastened by certain safety-pins, of which each had its prescribed place and function. It fell to the lot of Mr. Lister, as he then was, to assume the responsible duty of subjecting to surgical treatment a lady of extremely exalted rank. During the progress of the case he was one day driving away from the Royal castle, after dressing the patient, when a dreadful doubt gripped him. There was a brief, a very brief, mental struggle, and then the carriage was turned round, and confession was duly made to the occupant of the loftiest throne on earth that he had forgotten one of the safety-pins.

Lister stands probably alone among surgeons, in that he combined the qualities that make a great experimental investigator with those that are essential to a great clinical observer and student; and his capacity for adjusting the values attaching respectively to the lore of the laboratory and the facts of the bedside always seemed to me unerring and perfect, and to constitute one of the chief secrets, silent and intangible, of his power of sustained achievement.

As narrated by Sir Rickman Godlee in a recent address, his ingenuity and accuracy in devising and carrying out bacteriological experiments called forth expressions of astonishment and admiration from Pasteur, while Sir Michael Foster once referred to him as "one whose career as a practical surgeon we as physiologists selfishly deplore, for we see in him a puissant captain." There are few more significant principles contributing to form the substratum of good and successful work at the bedside than a just estimate of the correct relationship between clinical and experimental work; and lack of the requisite clearness of mental vision in this matter is, I believe, one of the most potent causes of unexplained disappointment and failure. We sometimes observe a man of high intellectual power, honest, painstaking, and industrious, who seems to unaccountably fail; and by that I do not mean in respect of worldly advancement and public estimation, but he fails in the actual practice of his profession at the bedside. If I were asked to state in general terms what in my opinion is the most frequent defect that underlies this regrettable phenomenon, I should reply without hesitation, "Inability to distinguish clearly between the teachings of the laboratory and those of the bedside." Let it not be thought for a moment that I underestimate the extreme value of experimental research; quite the reverse is the case. It has sometimes happened to me to be asked by a young aspirant to become a hospital surgeon and practitioner of surgery, how is he to begin? His practice is all in the future. He has not as yet, perhaps, a hospital appointment. What can he do that will help him to both? What work shall he work at that will, as he expresses it, "lead to something"? My answer is always the same, "Go to the laboratory at the university and work at something; it matters little what, so long as you work. Try to find out all about something, and you will soon find that you know more about your subject than other people do. No fragment of knowledge but has its value, and the value will be enhanced to you a hundredfold if it happens to be your own peculiar possession. Its acquisition will surely lead the way to further important attainments, until presently the widening sphere of your knowledge will begin to touch at various points the province of the worker at the bedside." Some thoughts such as these must come to us when we glance at the earlier scientific work of Lister, and note the nature of his inquiries. In respect of science, and particulary those departments of scientific research that are dependent on the microscope for their elucidation, Lister may be said to have been " born in the purple," for his father was a distinguished scientist, who made weighty contributions towards the perfecting of the compound microscope. It is not surprising, therefore, that the earliest scientific researches of the famous son should have been guided and influenced by this circumstance, so that we find him at twenty-four years of age bringing forward noteworthy papers upon such subjects as " The Cutaneous Pigmentary System of the Frog," " The Contractile Tissue of the Iris," " The Muscular Tissue of the Skin," and " The Structure of Involuntary Muscle-fibre"—all notable equally for minuteness and accuracy of observation and reasoning as for independence of thought and faithfulness and simplicity of description. Very soon we find the subjects that engage his attention are beginning to assume a character of more direct clinical significance; and with researches on " The Early Stages of Inflammation " and the Croonian lectures on " The Coagulation of the Blood," we become conscious of the first steps on the path of scientific study which will eventually lead him to the great achievement of his life.

I have made a somewhat long digression preparatory to emphasizing what always seemed to me the almost inspired faculty possessed by Lister of sifting out from the store of his scientific knowledge that which was available for employment in actual practice at the bedside, and putting aside what was too incomplete and theoretical to be reckoned with. Perhaps no better illustration of this could be advanced than his attitude on the subject of anaesthetics, a matter to which he devoted special interest. Chloroform was the agent exclusively used, and it was always in his hospital practice given by a student. This does not mean that the administrator was ignorant and untaught ; on the contrary, he was most thoroughly drilled in the principles that were to guide him in the administration, and those principles were of the simplest. Briefly, the administrator's attention had to be concentrated on keeping the airway free and unimpeded, and by means of certain signs to read the individual patient's condition like a book ; but he was not permitted to examine the heart or to feel the pulse.

This last feature of his method has given rise to much wonderment and adverse criticism, and I would like to endeavour, if I may, in a few sentences, to set forth what I believe to be the kind of reasoning upon which it rested. Experiment is able to show that if a dangerous overdose of chloroform be given slowly and in proper dilution cessation of respiration will invariably occur before cessation of the heart's action. It is also well recognized that rapid overdosage by too concentrated vapour of chloroform will cause sudden death. Both of these sources of danger can be quite effectually guarded against, but the finger on the pulse will be of no value in either. But again it is admitted that, apart from either of the above causes, a patient will very rarely suddenly die under chloroform ; will the finger on the pulse not prove a serviceable aid in such a case ? There is not the slightest reason to suppose that it would ; in fact, it is dead-certain that it would not. It is true that administrators have stated that they believe they have received valuable warning of danger from the behaviour of the pulse, but how can they possibly tell ? Such statements are the merest guesswork. Moreover, there is no reason for supposing that the patient dies because the heart stops beating, because it is just as obviously true to say the heart stops beating because the patient dies. The fact is we concentrate our attention upon the heart simply because it is the first and most tangible object for us to literally put our finger upon ; but surely if we are to probe the mystery of sudden death at all we must go further back than the heart, to the nervous system that controls it. There has of late years been a small army of skilled workers who have devoted immense efforts toward the elucidation of the mystery that surrounds many examples of death under anaesthetics ; and we of Melbourne regard with justifiable pride the fact that we have in our midst a worker in Dr. Embley, who by patient and indefatigable labour has made contributions of lasting value to our store of physiological knowledge, bearing on the innervation of the heart and vascular system, a subject peculiarly concerned, as it would seem, with the phenomena of death under anaesthetics.

Nevertheless, valuable as such researches are, it cannot be too clearly stated that any endeavour to carry their teachings from the experimental laboratory to the operating-room is likely in the present state of our knowledge to render confusion worse confounded, and to bring about the very disasters they are designed to prevent. Our knowledge of the physiology of the nervous system consists, in any case, of a small sprinkling of isolated facts that together constitute only a fraction of a vast territory as yet unexplored. To convert our knowledge of the nervous system into active treatment is only here and there advantageously possible, but the intimate relation between the nervous system and the fact of sudden death is at present entirely outside our field of practical endeavour, and it is well for us to recognize it.

What we are wont to call " the mystery of life " awaits solution, and whatever the solution may be it would seem certain that it will be at least intimately concerned with the physiology of the nervous system ; and when the mystery of life is solved, as it doubtless will be by those who come after us, then will the mystery of life's sudden cessation, that we call "death," be likewise revealed. It was, I conceive, upon some such lines of reasoning as that I have laboured, withal imperfectly, to sketch, that the master mind of profound thought on minute physiological detail determined that in a matter involving such tremendous issues as the administration of chloroform, the safer course is to let the heart severely alone, and trust to the guidance of other and simpler things. It would hardly be possible to instance a more striking example of the capacity for distinguishing and excluding from practical application theoretical matter that he believed to be indeterminate and incomplete, and consequently unsafe for our guidance. Some few years ago there appeared the report of an address delivered by one of the foremost of our English surgeons, Sir Berkeley Moynihan, under the title of " The Pathology of the Living." The theme of this discourse—as original in its substance as in its title—was designed to point out that the pathologist can by no means be regarded as the sole repository of pathological knowledge but that, on the contrary, the sphere of his labours is subject to very distinct and notable limitations in many directions, and that these barriers that oppose themselves to the pathologist can in many cases be readily passed by the observant practical surgeon, and by him alone. So numerous are these instances that it has come about that the pathological discoveries of the clinical observer constitute a distinct field of pathological knowledge that could never have been opened up and worked by the student of the pathological laboratory and the dead-house. It would appear at first sight difficult to instance a more striking example of the inter-relation between laboratory research and clinical findings than this; nevertheless it would appear even more remarkable that there should be also an anatomy and embryology of the living—that is to say, a certain field in those subjects in which the anatomist and embryologist must look to the clinician for suggestion and guidance. I think it probable that, but for the information provided by clinical experience, the embryologist unaided would have known but little even to-day of such an obvious arrest of development as hare-lip and cleft palate, while I am pretty sure that such a condition as imperforate rectum would have remained undiscovered altogether, or perhaps have been recorded as a curiosity and enshrined as a museum specimen. I must ask your indulgence in alluding to a matter in which I have had some personal concern, but I would point out that for generations the fact that, roughly, 23 per cent. of individuals have peritoneal sacs occupying one or other of the commoner seats of hernia had escaped the eye of anatomical research, until reasoning, based upon clinical observation, seemed to render it certain that they must be there; and then they were looked for by Mr. Murray, of Liverpool, and promptly found. Again, the explanation of the remarkable tendency of femoral hernia to pass upward over Poupart's ligament was unknown until the mystery was solved by clinical observation and reasoning, although the causation of the occurrence is entirely a developmental one. The fact, too, that an obturator sac is present in individuals with a frequency that vastly exceeds the frequency of occurrence of the rare obturator hernia is a piece of anatomical knowledge that is, I believe, peculiarly the property of the Melbourne University Anatomy School. It is significant that the one redoubtable opponent of the saccular theory of hernia is to be found in one of the most distinguished anatomists of our time, Professor Arthur Keith, who occasionally shivers a lance against it, but whose brilliant and valued career has adorned a field into which clinical work has not entered.

I am anxious to pass from this subject to others that have less of a personal colouring, but I cannot forbear to draw attention for a moment to Lister's attitude on the question of what is commonly spoken of as the radical cure of hernia. He was, I believe, the first surgeon of modern times to perform an open operation for non-strangulated hernia, but he frankly disbelieved in the possibility of curing hernia by operation; and with the knowledge in his possession as to the etiology of hernia, that view was surely well founded and inevitable. He considered that the proper purpose of operation could only be to render a hernia that was not controllable by a truss amenable to truss-treatment—to reduce the irreducible hernia and to remove adherent omentum from the canal. It was to him inconceivable that by any method of suturing, or by any other artificial device, the weak incompetent abdominal wall could be rendered permanently strong and efficient. This view was, of course, based on the belief current in his day that hernia was the result of weakness of the musculature of the abdominal wall, and is an interesting example of acute and correct reasoning betrayed into error by an unsuspected flaw in the scientific knowledge underlying it. On the other hand, we are now in a position to state conversely that the saccular theory of hernia is essential to the rational conception of any possible operation for permanently curing hernia—or, to put the matter in a somewhat different way, if the saccular theory were not true no operation for the cure of hernia would be possible.

Among the numerous enduring impressions that I received when as a mere lad I had the great privilege and delight of sitting at the feet of Lister was a possibly exaggerated distrust of the value of statistics, and of what I may term the statistical method when introduced into the study of surgical questions. I am speaking of a time when the value of antiseptic methods in surgery was regarded as a " question," and the claims advanced by Lister as " not proven." It sounds very absurd now to suggest an appeal to statistics to prove that aseptic wounds are more desirable than infected ones; but that is, of course, an instance of wisdom coming after the event. In any case, statistics were always being demanded, and, what is more to the point, when they were forthcoming they seemed ludicrously incapable of demonstrating anything. It was vain for Lister to aver, as he did time and again, that the matter was not one for statistics at all; that sounded like an evasion. Nevertheless, the veriest tiro who saw and was taught to understand his principles and methods could see quite clearly that statistics were not wanted. A famous Continental surgeon, when shown for the first time the phenomenon of the organization of blood-clot occurring in a gaping osteotomy wound, exclaimed in astonishment, " Statistics have nothing to do with this." I learnt a great lesson from that incident, and one that has frequently been brought to my memory. That great surgeon did not scruple to draw immense and far-reaching conclusions from the thoughtful observation of a single case. Since that day I have very frequently heard a warning uttered as to the danger of generalizing from a single instance, and of the necessity of having a number of cases under review before any safe conclusion can be arrived at. I always think this is rather a pity, and I must confess to a firmly rooted belief in the supreme value of single instances accurately studied. Whatever happens in any case happens in obedience to pathological law, and the laws of pathology are just as immutable as any of the other laws of nature. Any apparent violation of pathological law can only mean that there is some underlying factor that has escaped our detection, and should impel us to a closer and more searching scrutiny to lay it bare; whereas, on the other hand, it is very easy to foster an attitude of philosophic agnosticism in the presence of any deviation from the traditional normal, which is a distinct encouragement to put it aside as something dangerous and misleading. A series of hundreds of operations, tabulated and arranged and nicely rounded off in terms of percentages, always seem to me to possess but very limited value, so limited indeed that it is strictly confined to one person—the surgeon who performed the operations; and even he can learn nothing from the contemplation of his tables when he has compiled them. The rich experience he will have gained cannot even be expressed in that way, much less can it be imparted to others, for it will consist actually in the sum of a multitude of observations of individual cases, all of them obeying pathological laws which are fixed and which never vary. After all, it is not the fact of performing a large number of operations that in itself constitutes real experience, unless in addition the surgeon who performs them possesses the qualities that are essential for a good clinical observer. And what are those qualities? Can they be in any way defined or indicated? Or, better still, can the practical steps by which a surgeon should seek to make himself a good clinical observer be set forth for our help? In order to do this, I cannot do better than refer to two of the notable features of Lister's hospital-work. First, he visited his wards every day in the week; secondly, he invariably dressed his operation cases himself for the first few days. We might be tempted at the first blush to write this down as philanthropy, the more readily that the character of Lister displayed, in a measure to which my experience can furnish no parallel, the true philanthropic instinct. But it was not philanthropy alone that impelled him; there was a practical aim to be achieved. Put shortly and in simple terms, he was profoundly conscious that the daily observation of individual cases is the only sure way to be continuously accumulating knowledge. The mere performance of an operation or of any number of operations can impart knowledge of only a very circumscribed and imperfect character. The close following of a single case from day to day, the close scrutiny of the behaviour of a wound, of the sutures, of the discharges, and of the general phenomena displayed by the patient will yield a richer harvest of valuable equipment to the surgeon than any amount of operative experience, in which the after-treatment is committed mainly to the charge of others. Of all the practical lessons that I carried away from my studentship under Lister, I am disposed to rank the instilment of this principle in the highest place.

And now I am conscious that the period during which it is fitting for me to claim your attention is nearing its term, and I am apprehensive lest there may be some among you that will have experienced disappointment at my choice of a subject which is not closely connected with the burning surgical questions that for the moment are exercising our minds. There is no lack of such material; it is, indeed, so abundant that the difficulty of making selection would have been formidable. The dreadful mystery of malignant disease is being hard pressed by the organized onslaught of a scientific army, but the secret has not yet been dragged forth. The whole world, both medical and lay, is holding its breath at the therapeutic possibilities that may evolve from our better acquaintance with radium, and the wise are also withholding their judgment, but in no carping spirit. The operation of gastro-enterostomy has found itself; its sphere and its limitations have become defined, its value enormously enhanced thereby, and what was quite recently a kind of surgical conflagration has settled down into a steady luminous flame. The conflagration has, however, only passed on a little, and the air is now heavy with accounts of bismuth meals, enteroptoses, and kinks. The dominant fact, nevertheless, is that since these matters are engaging the earnest attention of level-headed and honest workers, we may rest assured that the ultimate result will be a substantial increase in our knowledge. I might allude to numerous other matters that are either comparatively new or as yet imperfectly understood, such as the pathology and surgery of the hypophysis and of the thyroid and parathyroids;

or turning our thoughts rather towards therapeutic agencies, we have an inviting field in the use of serum-therapeutics and vaccines. But upon none of these subjects am I able to speak with the authority conferred by exceptional knowledge and experience. There has, however, been one subject that has been prominently in the surgical field that has possessed for me more than ordinary interest, and about which, if you will bear with me, I should like to make a few observations—that is, the question of the treatment of simple fractures, which occupied the attention of the members of this section at our last meeting in Congress, and since then has been prominently before the profession; and an organized attempt has been made by means of a committee appointed by the British Medical Association to investigate the respective merits of what are known as the operative and the non-operative methods, and to settle the vexed question as to whether it is necessary and right to cut down on recent fractures and fasten the ends of the bone together with plates and screws, or whether we may not rather look to improved methods of non-operative treatment for the amendment of our faulty results. After an exhaustive investigation a very minutely detailed report was published, which was surprisingly inconclusive. It is true that the results of the operative method showed a slight advantage over those treated without operation, but surely unless this had been a foregone conclusion there could never have been any question about the matter to be answered. The case of the advocates of frequent operation was destroyed, moreover, by one strenuous proviso in the report of the committee, substantially to the effect that the resort to open operation should be the sole prerogative of skilled operating surgeons in hospital, while the ordinary practitioner must confine himself to non-operative methods; but seeing that the ordinary practitioner has to learn to treat fractures from skilled surgeons in hospitals during his studentship, his chance of learning to treat such injuries properly would obviously become less than ever in proportion to the readiness displayed by his teachers to substitute operative for the more difficult and troublesome non-operative plan. A most remarkable feature of the whole discussion appears to me to be presented by the fact that for some years past there has been a third method of treatment before the profession, advocated with energy and ability by the highest authority, and for which it is claimed that better results can be obtained than by either the old routine method or by the operative method of Sir Arbuthnot Lane. I refer to the method entitled by its author, Just Lucas-Championnière, "Treatment by Mobilization and Massage." Mention of this method gives me the opportuntiy of making reference to the great loss the profession of surgery has recently sustained through the death of the distinguished French surgeon. An excellent account of the method has been recently published by an English disciple of Lucas-Championnière, Mr. Mennell. Anybody reading for the first time the detailed accounts of the results obtained is likely to find them almost incredible, especially with respect to the rapidity with which union takes place, and the slight amount of shortening in fractures of the femur. Why, then, has this method of treatment not made more rapid headway? To my mind the reason is perfectly clear, in spite of the fact that I am prepared to substantiate with complete confidence the accuracy of the published accounts. The truth is, a most unfortunate tactical blunder was made at the outset in the choice of a title, and the profession has been frightened, and very justly frightened, by the terms "mobilization" and "massage." It might not unnaturally be supposed that "mobilization" meant some kind of deliberate moving about, and that "massage" meant "massage," but it is scarcely possible to overestimate the gulf that separates the real truth of the matter from what would appear at first sight to be the meaning of the terms used to express it. If, instead of "mobilization and massage," the method had been designated "simplicity and common-sense" it would have been quite as correctly entitled, and long ere this it would have gained universal acknowledgment and driven all competitors from the field.

I have no time to devote to a detailed account of the methods we have been adopting in the treatment of fractures, but in a few brief sentences I should like to set out some of the more important conclusions at which we have arrived,—

(1.) The difficulties met with in the treatment of fractures are undoubtedly largely—I do not say entirely—of our own making.

(2.) The long Liston splint in the case of the thigh, all appliances with foot pieces in the case of the leg and ankle, almost all splints for fractures of the humerus, and most splints for the forearm are ingenious devices for the creation of difficulties.

(3.) There is usually, if not always, a position of the limb in which the fragments will fall naturally into place, provided they are free to do so.

(4.) When there are a number of long and powerful muscles acting upon the fragments, as in the case of the thigh, a light extension is necessary to combat the tonic contraction of the muscles.

(5.) Any apparatus which would be uncomfortable and annoying if applied to an uninjured limb will, *à fortiori*, be more uncomfortable and more disturbing if applied to an injured one—a simple little common-sense principle that is often strangely overlooked.

(6.) It is an absolute rule that no recent fracture shall be put up in splints and left for several days; the splints must be taken off frequently—at least every second day, or better, every day—the patient encouraged to move the joints, fingers, toes, as the case may be, and generally to carry out the essentials of "mobilization" as laid down by Lucas-Championnière, and take an intelligent interest in his fracture, and not be afraid of it.

Here is an illustrative example of the kind of method I have been employing for some time past which may possess some interest: Some months ago a body of students from the other two large teaching hospitals of Melbourne came by invitation to see the Alfred Hospital; and, among other things, I took them to the bedside of a muscular young footballer who had been admitted a few days before, and made, in substance, the following remarks to them: "This is a fracture of the shaft of the femur about the middle in a very muscular man, and this is the way we treat such an injury. No long splint is used; simply extension in a comfortable slightly flexed position by means of an arrangement of small pulleys, thin cord, and zinc oxide plaster. The limb is supported comfortably on pillows, and abducted. The measuring-tape shows there is no shortening whatever. The patient can raise himself up, be propped up at times, and generally move about and make himself comfortable, so that the irksomeness of his confinement to bed is reduced to a minimum. We find that by this method not only are the final results infinitely better than those we formerly were able to obtain, but the period of treatment is shortened by nearly one-half. Firm union is usually obtained in four weeks. I expect it in this case, and shall be disappointed if it does not occur. One of the pieces of knowledge that has come to me since I have been treating fractures in this way is with regard to the extreme rapidity, almost one might say suddenness, with which a bone will unite; it all seems to happen in the course of about the fourth week."

The foregoing are, in substance, the remarks I made to the students. That which actually happened in that case was as follows: At the end of three weeks there appeared to be no union; three days later the bones were obviously united with semi-firm union, while at the end of four weeks the fracture was absolutely firm. I then discovered that the alignment of the bones was not quite correct, but that there was a slight convexity forwards, causing an exaggeration of the normal anterior curve of the bone. It was not a serious matter, but in order to correct it I suspended the leg at the knee, and passed a jack-towel, to which was attached a 20 lb. weight, over the middle of the thigh, and hung it over the opposite side of the bed. I failed, however, to make any impression on the firm union, and after trying for three days in this way gave it up. It was a matter of only trifling importance. At the same time there was in the ward a case of Pott's fracture in a young man. At the end of a fortnight he was allowed to take splints off during each day, and reapply them at night. At the end of three weeks he left the hospital. These are precisely the type of results obtained, so far as I can discover, by the late Dr. Lucas-Championnière and Mr. Mennell. The method employed, so far from being elaborate and alarming, is at least as simple as the older methods, and quite as easy for the busy general practitioner to master and employ. Moreover, it appears, unless I am greatly mistaken, that the methods that for the last two or three years I have been employing in the treatment of fractures, of which the two cases briefly narrated will serve to roughly indicate the general plan, differ in no essential feature from the methods of Lucas-Championnière. But with this bare allusion I must perforce leave the subject, for which I hope shortly to find some other opportunity for a more detailed statement.

This address has, by intention and design, been about my old master, Lister, and it is not altogether without fitness that it should be brought to a conclusion with the subject of simple and compound fractures, for we all remember that it was in the treatment of compound fractures that modern surgery had its birth. In any case, I believe that I gauge the feeling of you all aright if I submit that nothing of an intimate nature that pertains to the personality of Lister can at this juncture fail in interest for members of our profession.

It has been truly said of the great English statesman, Gladstone, that by his example he introduced a new and exalted standard of honour into international politics. If it cannot be said of Lister that he introduced into surgery a standard of ethics that was in any way new, that is simply because our profession has always abounded in men of lofty ideals and singleness of purpose. We of the medical profession believe—and I do not hesitate to risk a charge of arrogance in voicing the belief—that the greatest men of our profession are the greatest men that the race of mankind has to show. Sir Berkeley Moynihan the other day, in speaking of Lister, referred to him simply as " the greatest man our profession has produced "; and those who knew Lister intimately, who became conscious of his humble-mindedness and modesty, his purity in thought word and deed, his deep and child-like religious faith, and his abounding love of his fellow-man, recognize that they have witnessed the culmination of the highest qualities that civilization has as yet brought forth. We cannot hope to emulate his great achievement, but we are here to make serious endeavour to contribute each of us something towards the furtherance of the healing art that he pioneered for us, and our strivings can but be aided and fortified by turning our mental gaze upwards " unto the hills " ; and I would venture in conclusion to quote from the words of yet another of the world's great teachers, words which seem to me peculiarly appropriate to the purpose of this address, " Whatsoever things are true, whatsoever things are honest, whatsoever things are just, whatsoever things are pure—if there be any virtue, and if there be any praise, think on these things."

THORACIC SURGERY AND INTRATRACHEAL INSUFFLATION.

By the Hon. Dr. Nash.

The devising of a reliable method for obviating the dangers appertaining to operations upon the thoracic wall or the viscera lying within the thorax, collapse of the lung and pneumothorax, has occupied the minds of many surgeons and their associates in the experimental field. The physical phenomena concerned are those bearing upon the relationships which exist between the air within the acting lungs and the atmospheric pressure. If their proper proportions be materially displaced hyper-distension or collapse of the organ may result.

Negative or positive pressure chambers, into which the head of the patient is placed during the operation procedures, have been constructed. The essential feature of each has been—a compartment for the patient's head; an electric motor; an air-pump driven by this motor; a series of tubes, filters, taps, and bottles, through which the pump will drive air, ether, or oxygen, or a mixture of any of these; a mercury manometer connected to the tubes, that the observer may at any moment know the state of the pressure under which the gas is circulating.

The Sauerbruck cabinet, the Willie Meyer operating-chamber, were amongst the best known of the larger apparatus. The Janeway and Green positive pressure cabinet was successfully employed in the Surgical Research Laboratory of the College of Physicians and Surgeons, and was also used for operations on the human subject. The object to be attained was, in all cases, to " permit of a true artificial respiration independent of the efforts of the patient " (Keen, vol. vi, p. 395, par. 3).

The Janeway and Green cabinet was considered portable, yet it was only so when every convenience was obtainable for moving it. The chambers of Willie Meyer and others were fixtures, as part of a house

All had their uses, and constitute rungs on the ladder which have led to simplified apparatus. Much credit is due to these pioneers. They are reaping their reward, in that surgeons throughout the world are commencing to attack with confidence diseases of the lungs, the mediastina, and the heart.

The apparatus put together by Dr. P. Fiaschi is simple and portable. When it has been used the action has been satisfactory beyond expectations. Having had, by his courtesy, opportunities for observing the application of the method in dogs, I was impressed with the anaesthesia produced.

In my service at the State Hospital in Sydney we first tried it on a case, in which there was a discharging sinus running from a cavity communicating with a bronchus to the skin-surface. A large amount of purulent material was being coughed up at intervals. This consisted of pus and shreds of varying kinds of tissues, and its presence was the reason for the patient seeking relief. Both by night and day he had to cough it up. Much distress and inconvenience was caused thereby. About twelve months previously he had been operated upon for a hydatid of the right chest, said to be of the right lung. The scar at the base of the chest had healed.

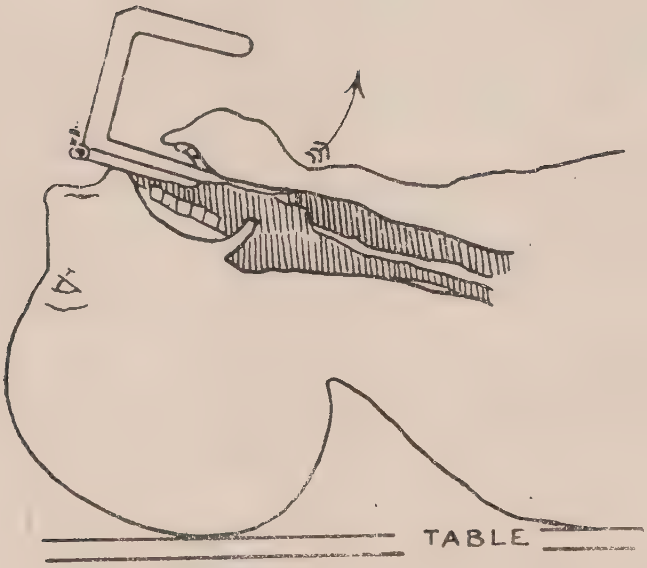
An X-ray picture showed the outline of a sac within the chest. This communicated with a bronchus, and the material which was excreted, and which accumulated within it, had to be expelled through the air-passages.

Anaesthetic.—The silk-web catheter was passed into the larynx and trachea by Dr. Fiaschi. Some trouble was caused during the procedure by the patient coughing up the material which had accumulated in the sac. The initial difficulty having been surmounted, the anaesthesia was very satisfactory for the operation. This consisted in opening the chest-wall and finding the sac wherein was being produced the discharge. Some endocyst remained from the hydatid, and it acted as a focus promoting the continuance of his trouble.

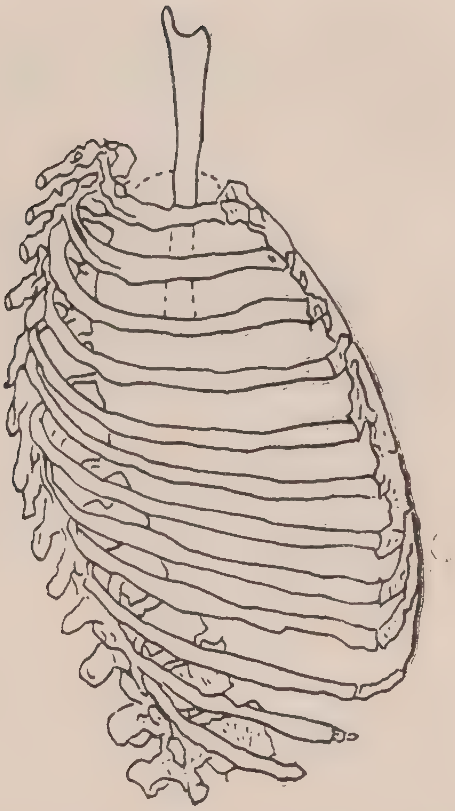
The case was not an ideal one as a test for the intratracheal method of anaesthesia, because it did not involve the necessity of opening up the pleural cavity, without which no pneumothorax and pulmonary collapse happens. Adhesions and anatomical alterations, consequent upon the growth of the hydatid between the lung and the chest-wall, had pushed away the lung and had diminished the capacity of the chest. During the operation the anaesthesia was ideal, and so impressed me with its safety that every opportunity has since been taken to administer ether after this manner, and when our equipment is complete we hope to gain further experience. The case was selected because of the probability that the pleural sac would be opened and the moving lung have to be dealt with.

Anaesthesia.

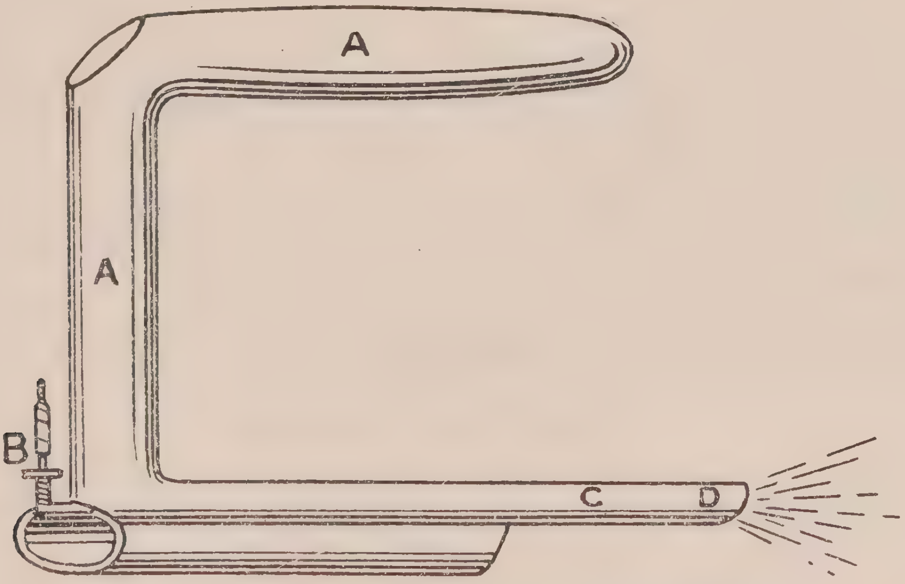
Introduction of Tube.—The passing of the woven-silk tube into the larynx and trachea is the first act required for the insufflation. Two methods have been used at the State Hospital. That either may be accomplished rapidly the patient must be fully anaesthetized by the ordinary open method—first, by the sense of touch ; second, with the use of the direct laryngoscope.



Schema illustrating the direction of motion to be imparted to the laryngeal speculum in exposure of the larnyx for the introduction of the insufflation tubes.



Schema illustrating approximately the average normal direction of the trachea in the living. The direction is not vertical but backward as well as forward.



Laryngoscope or Laryngeal Speculum.

AA, Handle; B, electric-light attachment; C, reflector; D, site of electric bulb.

In the former the head of the patient may be extended or flexed, as the catheter with its stilette can be accommodated to any angle. A mouth-gag separates the teeth sufficiently to allow of the tube and the index-finger being introduced with facility; the finger is passed alongside the dorsum of the tongue over its base to the epiglottis, and so far as possible down the posterior surface of the epiglottis. The tube, with or without a stilette, is guided along the margin of the finger till it reaches the glottis, its point is then, concurrent with an inspiration, gently insinuated between the vocal chords ; when well past these the stilette, if used, is withdrawn, and the tube pushed onward to near, but not down to, the bifurcation of the trachea.

Second : The neck is extended so that from the sternal bone to the chin the anterior surface of the neck is straight. By this manoeuvre there is made practically a straight canal from the mid point of Cupid's bow on the upper lip and the upper incisor teeth through the mouth, pharynx, larynx, and trachea, its direction being downwards and backwards.

The teeth are separated, the direct laryngoscope is passed along the dorsum of the tongue and the posterior surface of the epiglottis. It is held firmly in the left hand, and the light from the electric lamp, by gentle manipulation, is brought to shine upon the vocal cords and between them into the trachea.

The catheter is taken in the right hand and is passed along the tube of the laryngoscope to the chink of the glottis and into the trachea. Care must be taken to avoid injuring the upper lip between the instrument and the teeth.

The exposure by the light is of advantage, in that one is enabled to note the state of the whole length of the canal, and to estimate the size of the catheter that will best suit the case. Whichever method is used the operator assures himself that the point of the catheter is within the air-passage by noting that the air is flowing freely in and out along the tube. If during the introduction there has been delay the anaesthesia will be less complete, then some coughing will indicate that the catheter has reached the trachea.

Of the two methods the direct is the better one, because one sees what one is doing. After sufficient experience either becomes easy to a man of average capacity. Care must be taken when extracting the laryngoscope that the catheter is not displaced.

A specially devised metal tube is inserted between the teeth and around the catheter to protect it from occlusion when the jaws are approximated.

If the stilette be used it is necessary to be quite sure that the metal point does not slip through the eye of the catheter.

Intratracheal Insufflation.

Points to be kept in view :—

(1.) See that there is no moisture inside the tube, or upon it, when about to introduce it. It must be dry.

(1A.) Never use force to introduce the tube. Use the direct method of laryngoscopy, because then one can see what he is doing.

(2.) The tube must not fit the chink of the glottis accurately, because the expired air has to pass between the outside of it and the inner wall of the tracheo-laryngeal passage.

(3.) Before attaching the apparatus to the intratracheal tube make sure that air is passing freely in and out of it.

(4.) When the apparatus is working smoothly the ordinary rules which guide one in recognizing the stage of the anaesthesia must be observed by the anaesthetist. As far as our experience has gone with ether, there has been no difficulty in this regard.

(5.) The person supervising the apparatus must be conversant with the channels and the taps, and with the working of the pressure manometer.

(6.) Intermissions in pressure must be allowed to take place three to six times per minute.

(7.) Keep an eye on the catheter lest it slip out from the mouth.

An intertracheal insufflator should be an item of equipment in every hospital, not alone for anaesthesia, but as an artificial respirator. By the catheter the breathing-channel is kept open, and air can be directly poured into the lungs with certainty, a vastly different proceeding from the more or less haphazard methods presently employed for resuscitating persons suffering from apnoea. Collapsed lungs, or portions of lungs, can be forced to distend, and the blood-vessels to dilate, so that the vital fluid may have chance to flow along them to give life to the tissues. If necessary the blood may be oxygenated.

Advantages.

As far as our experience has gone,—

(1.) The degree of anaesthesia can be rapidly regulated, and to a nicety.

(2.) Confidence is given to every one concerned at the operation, because he knows that pure filtered air, or this mixed with oxygen, can at any moment be driven into the bronchial tubes, and the elasticity of the distended pulmonary tissue will force the respired air and gas out of the lungs, both without action by the respiratory striped muscles of the patient. The dangers from closures of the glottis or loss of power in the chest-muscles during an operation ceases to be a menace to one's comfort.

(3.) In cases where the pleural sac is opened the lung can be kept distended to the desired degree, and when the surgeon is ready to close the chest-wall the pleural sac can be completely filled with the lung. Lung-collapse need not be feared. The distension of the lung depends upon the working of the blower and the closing of the tubes.

(4.) On the slightest appearance that the medulla oblongata is becoming saturated with ether, as indicated by signs of apnoea, filtered air can be poured into the lungs by shutting off the ether-bottle with the taps, or, if desired, oxygen, or a mixture of this with air.

(5.) The dangers and disadvantages incident to the accumulation of blood and mucus in the pharynx and dropping backwards of the tongue are entirely avoided.

(6.) Spasm of the glottis cannot occur.

(7.) No foreign substance present in the mouth, nose, or pharynx can pass into the larynx.

(8.) If from climatic or other reasons it be desirable to warm, moisten, and wash the air or the anaesthetic before passing it into the lung, a bottle filled with warm water can be introduced to the circuit of the tubes.

(9.) In such operations as those for diseases of the thyroid gland in proximity to the trachea and the important nerves in the neck, special dangers, which are said to be present, are eliminated.

(10.) As the natural breathing-movements are almost supplanted by the blower, the muscular action is but slight and may be abolished. This decreases the liability of the coils of intestine to pass through the wound during abdominal operations.

(11.) There is no waste of anaesthetic. Every drop has opportunity for performing its share in producing suspension of consciousness. Important in the work of a large hospital service. In our eleven cases the average amount of ether used per case was 4 oz. The average duration of the cases was about sixty minutes.

(12.) The "death space" of Meltzer, the oro-pharyngeal laryngeal canal, ceases to deserve the name, because it is but a passive factor during anaesthesia.

(13.) In our cases post-operative shock has been markedly less than what is observed after the like operation proceedings where the anaesthetic has been administered in ordinary way.

(14.) Can be used in all cases about the mouth and in all postures with the anaesthetist out of the way, and apparatus reduced to a minimum.

In a dog both pleural sacs widely opened. At Dr. Fiaschi's surgery on the 25th January, 1914, it was interesting to note the ease with which the lung-tissue could be allowed to partly collapse and then to be distended to entirely fill the pleura or project through the incision. With the collapsing, the tissue took on an appearance of solidarity, the colour losing lustre, then with distension the aerated tissue and pink colour of the visceral pleura bespoke healthy action of the air vesicles and of the flowing blood. In the former state one suspected that life was like to ebb away, but with change to the latter confidence was revived that the lungs were performing their functions fully. As the ligatures approximating the parietal pleura and ribs were tied, the lung was made to fill the enclosing sac.

All these points may have been noted during Dr. P. Fiaschi's demonstration.

Dangers.

Anaesthesia by Intratracheal Insufflation.—Page 970, first and second paragraphs (Keen).

(1.) Using an unsuitable catheter.

(2.) Any rough handling of the tube while introducing it, leading to injury of the larynx or trachea.

(3.) Emphysema of the lungs, if care be not taken.

(4.) Fluid passing along the tube into the bronchi, due to want of care in preparing the catheter.

(5.) Prolonged use of chloroform is said to result in irritation of the lungs.

Disadvantages.

(1.) The size, weight, and complication of the apparatus.

(2.) Where electricity is not available, it practically necessitates the presence of an extra man at an operation.

(3.) Some manipulative dexterity and practice is required that one may introduce the catheter with facility.

(4.) The patient has first to be anaesthetized in the ordinary way, to allow of the catheter being passed into the trachea. With extended experience a local anaesthetic will likely be found to be quite sufficient.

Dr. Hamilton Russell, in his address to this section, referred to the sudden deaths during anaesthesia due to overdosage. With the insufflator ready for immediate use there is at hand a method which would in all cases resuscitate the patient when the cause is due to some fault in the passages of the mouth, pharynx, or trachea, and the best means for supplying in the briefest time aerated or oxygenated blood to the medulla oblongata, whereby the poisoning material would be displaced and the nerve elements restored to their normal function.

Whatever may have been the cause of these deaths, there has not anteriorly been at hand a method whereby precise treatment can be applied, the lungs distended, respiration maintained, the poisoning material driven out of a large part of the air-passages, the blood oxygenated, and precious time gained during which the vital spark, only set in abeyance, may revive.

Many of you noted yesterday how placidly the dog lay on the table after the tube had been passed into the trachea. So is it with the human individual. The insufflation supplants the efforts of the patient to breathe, and life is maintained by mechanical means.

Notes by Dr. McDonald,

Anaesthetist at the State Hospital, Lidcomb, New South Wales.

These observations were made in a series of eleven operation cases at the State Hospital, New South Wales.

(I.) *Type of Patient.*—All were males.

Three cases represented the vigorous, husky, alcoholic type—patrons of the strenuous life—such as usually require chloroform anaesthesia. They were muscular subjects, and well calculated to "try out" its efficiency in producing full relaxation of the voluntary muscles. In the first case only the very slightest rigidity persisted, while in the two following cases (though in one class the subject was the same person) full relaxation was obtained. In none of these cases was any complaint made by the surgeon.

Another case represented a weather-beaten weak man, who looked much older than his years—sixty-one. He had cardiac arrythmia, and the use of chloroform would have caused some anxiety, more particularly as the operation was the rather formidable one for epithelioma of lip, with glandular involvement. The operation lasted two hours and a half, without any anaesthetic incident.

One case was for an intrathoracic operation (hydatid of the lung), in which intratracheal etherization is the anaesthetic *par excellence;* three and six were such as would be expected to give good results with any anaesthetic. The ninth, tenth, and eleventh were inguinal hernia, laminectomy, and decompression of brain.

Age.—The average age of the patients was about forty-one years.

Preliminary Injection.—In each case a preliminary alkaloidal injection of $\frac{1}{4}$ gr. of morphine and $\frac{1}{100}$ gr. of atropine was given from one half-hour to two hours before the operation. This accounted for the condition of the pupil in some cases.

Induction.—Five cases were induced with chloroform and six with closed ether (Hewitt's inhaler).

Intubation.—In eight cases Dr. P. Fiaschi introduced the catheter with the aid of the direct laryngoscope illuminated by electricity; in the remaining three, indirectly, by touch of the finger. It is difficult to say which proved the more efficient, though from the excellent view it affords of the larynx, the direct laryngoscope is to be preferred.

Post-operative Features.—In five cases no vomiting occurred; in one the patient vomited only once, the morning after the operation; while in two cases vomiting to a fairly large degree occurred during the evening. Two cases suffered from cough after the operation. The advocacy of the anaesthetic, on the grounds of its freedom from post-anaesthetic troubles, was therefore only partly sustained.

The Operations.—Each is described in detail in the *résumé*, but two probably merit some discussion,—

(*a.*) The intratracheal insufflation was first used for a case of hydatid of the lung. The operation lasted three hours, and the anaesthetic allowed of the fullest surgical manipulation without anxiety. How long it would be possible to keep a patient alive, with all respiratory movements abolished, is of interest. Dr. Meltzer proved it was possible to keep animals alive for prolonged periods.

(*b.*) Epithelioma of Lip, with Glandular Involvement: In these cases the machine was manipulated by an assistant, the anaesthetist sitting near the patient's head, without impeding the surgeon in any way.

(*c.*) Although ether was used the mucus was moderate in amount.

(*d.*) There was no swallowing of blood, and the claim that such is impossible under this method was borne out.

(*e.*) In this case there was not post-operative vomiting or sickness.

Effect on the Cardio-respiratory Mechanism.—In each of the eleven cases the pulse-beats maintained the characters noted before operation, but were a little hurried. There was no sign of failure of the heart. The anaesthetic causes some degree of congestion of the face. This congestion occurs even when the anaesthetization is slight, and the anaesthetist must not be misled into giving the patient more air, as he will " come out " very quickly.

Apparently the intratracheal insufflation allows of the normal carrying-out of the functions between the heart and the lung during the anaesthetization.

Absence of Anxiety.—There was no anxiety during any of the eleven cases, and the anaesthetist had the confidence of knowing that he could order pure air or oxygen to be pumped into the patient's lungs at any moment.

The Anaesthetist.—It is necessary to know the instrument and to be sure that its mechanism is acting properly, but otherwise no special skill is required in administering the anaesthetic.

Each of these eleven cases was given by a resident with no previous knowledge of these methods, assisted by a very capable mechanic, and under the guidance of Dr. Piero Fiaschi.

Anaesthetic.—The average amount used was less than 4 oz. per case.

A few Practical Hints for the Anaesthetist.

(1.) It is well to have the patient deeply under for the intubation, whatever method is employed.

(2.) If the machine is manipulated by an assistant give him your instructions clearly, and ask him frequently what mixture he is giving.

(3.) Let nothing impede the tube externally from the mouth to the instrument. The tube inside the mouth cannot become blocked, so do not interfere with it.

(4.) Pump out with pure air as soon as the surgeon begins the suturing. *Do not remove the tube till the reflexes return.*

(5.) Remember that a patient " comes out " very quickly from this anaesthetic.

(6.) The congestion of the face is a feature of the anaesthetization, though the latter may only be " slight."

(7.) In operations on the abdomen keep the patient well under.

Résumé *of Eleven Cases of Intratracheal Anaesthesia, State Hospital, Lidcomb, N.S.W.*

No. 1. Date, 28/11/13; initials, W.S.; sex, M.; age, 37; type of patient—big, husky, alcoholic; case—cystoscopic examination; preliminary injection—$\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine half-hour before operation; induction—chloroform, required large amount and long excitable stage; intubation—third attempt, direct laryngoscope used; intratracheal anaesthetization—duration forty minutes, pulse regular, amount used 4 oz.; features—pupils contracted, eye reflexes not totally lost, and reappeared quickly; post-operative—no vomiting; observation—slight rigidity of abdominal muscles throughout, patient had to be kept under influence of pure ether through most of the operation, no anxiety during the operation; conclusion—chloroform would probably have been more effective, but the anaesthetic was superior to open ether, and probably also to the closed inhaler, which would have been cumbersome in this case.

No. 2. Date, 28/11/13; initials, C.M.; sex, M.; age, 52; type of patient—vigorous, middle-aged man; preliminary injection—$\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine half-hour before operation; induction—chloroform without incident; intubation—direct laryngoscopy, first attempt; intratracheal anaesthetization—duration forty minutes, pulse regular, amount used 4 oz.; features—pupils contracted, conjunctival reflex absent; post-operative—vomited at intervals for twelve hours; observation—well under influence throughout, no anxiety; conclusion—very satisfactory anaesthesia, but case would probably have done equally well under any anaesthetic.

No. 3. Date, 28/11/13; initials, R.N.; sex, M.; age, 61; type of patient—weather-beaten, senile; case—epithelioma of lip, with secondary glandular involvement; preliminary injection—$\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine two hours before operation; induction—chloroform without incident; intubation—indirect laryngoscopy, second attempt; intratracheal anaesthetization—duration two hours and a half, pulse arrhythmic before and during operation, moderate amount of mucus, amount used 7 oz.; features—pupils contracted, conjunctival reflex absent; post-operative—remained quietly asleep for some hours, vomited only once the morning after the operation; observation—very satisfactory, chloroform in this case might have caused some anxiety owing to the arrhythmia; conclusion—advantages over other anaesthetics in a similar case: (1) anaesthetic was well away from field of operation of chloroform, (2) mucus was moderate in amount, (3) no swallowing of blood, (4) no post-operative sickness.

No. 4. Date, 5/12/13; initials, S.R.; age, 19; sex, M.; type of patient—young, thin, healthy man; case—laparotomy; preliminary injection—$\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine half-hour before operation; induction—closed ether (Hewitt) uneventful; intubation—direct laryngoscopy, first attempt; intratracheal anaesthetization—duration forty minutes, pulse regular but hurried, amount used $3\frac{1}{2}$ oz.; features—pupils moderately dilated, reflexes absent; post-operative—vomited at intervals during the evening; observation—most satisfactory, no anxiety; conclusion—case suitable for any form of anaesthesia.

No. 5. Date, 5/12/13; initials, W.S. (second operation); age, 37; sex, M.; type of patient—big, husky, alcoholic; case—cystoscopic examination; preliminary injection—$\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine half-hour before operation; induction—chloroform ($2\frac{1}{2}$ oz.), struggled violently in the excitement stage; intubation—direct laryngoscopy, first attempt; intratracheal anaesthetization—duration forty minutes, pulse regular but hurried, amount used 2 oz.; features—pupils dilated, reflexes absent, but reappeared quickly; post-operative—no vomiting; observation—kept under influence of pure ether almost throughout, no rigidity, but came out very quickly, satisfactory, no anxiety; conclusion—the anaesthetic proved suitable even for this type of patient, though perhaps inferior to chloroform.

No. 6. Date, 5/12/13; initials, W.H.J.; age, 51; sex, M.; type of patient—vigorous type of citizen; case—tubercular hip; preliminary injection—$\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine half-hour before operation; induction—closed ether (Hewitt); intubation—direct laryngoscopy, first attempt; intratracheal anaesthetization—duration forty minutes, pulse regular but hurried, amount used 4 oz.; features—pupils dilated, reflexes absent; post-operative—vomiting; observation—remained well under throughout, no anxiety, satisfactory; conclusion—case would have been suitable for any anaesthetic.

No. 7. Date, 16/1/14; initials, A.E.; age, 44; sex, M.; type of patient—strong, muscular subject; case—post-operative ventral hernia; preliminary injection—$\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine one hour before operation; induction—chloroform, a large amount was used, and the excitable stage was prolonged; intubation—indirect laryngoscopy, first attempt; intratracheal anaesthetization—duration one hour thirty minutes, pulse regular, amount used — oz.; features—pupils moderately contracted, reflexes absent; post-operative—no vomiting, but developed a cough after operation which lasted a few days; observation—all abdominal muscular rigidity abolished, and excellent surgical anaesthesia obtained, but patient had to be kept under influence of pure ether throughout; conclusion—this was a severe test for an ether anaesthetic, but it proved equal to the task, the surgeon expressing his satisfaction with it.

No. 8. Date, 7/7/13; initials, T.Q.; age, 26; sex, M.; type of patient—well-developed young man; case—hydatid of right lung; preliminary injection—$\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine one hour before operation; induction—closed ether (Hewitt); intubation—indirect laryngoscopy, first attempt; intratracheal anaesthetization—duration two hours and a half, pulse regular, amount used — oz.; features—pupils moderately contracted, reflexes absent; post-operative—no vomiting, had some cough, but due to the local lung-condition; observation—the breathing was very quiet, and in no way impeded the work of the operating surgeon; conclusion—in this case all thoracic movements could have been abolished, anaesthetic was satisfactory in all respects.

No. 9. Date, 21/1/14; initials, H.A.; sex, M.; age, 23; type of patient—young healthy man; case—herniotomy, and radical cure of hydrocele; preliminary injection—$\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine one hour before operation; induction—closed ether (Hewitt); intubation—indirect laryngoscopy, first attempt; anaesthetization features—pulse regular but hurried, time one hour, pupils were moderately contracted, reflexes absent, amount 3 oz.; post-operative—no vomiting, no cough; observation—anaesthetic fulfilled all requirements in this case; conclusion—this case may have done equally well under any other anaesthetic.

No. 10. Date, 30/1/14; initials, H.H.; sex, M.; age, 30; type of patient—strong and vigorous young man; case—laminectomy; preliminary injection—$\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine half-hour before operation; induction—chloroform without incident, short excitable stage; intubation—direct laryngoscopy, first attempt; anaesthetization features — pulse regular but a little hurried, time one hour twenty minutes, amount used 4 oz., pupils moderately dilated; post-operative—no vomiting, no cough; observation—the anaesthetic was satisfactory in all respects; conclusion—there was no anxiety whatever during the anaesthetization, and this form of anaesthesia can be recommended for this type of case.

No. 11. Date, 30/1/14; initials, W.B.; sex, M.; age, 49; type of patient—very strong, muscular subject; case—craniotomy, V-shaped flap of bone reflected and removed; preliminary injection—$\frac{1}{4}$ gr. morphine and $\frac{1}{100}$ gr. atropine before operation; induction—chloroform, struggled violently in the excitable stage; intubation—direct laryngoscopy, first attempt; anaesthetization features—pulse regular, time one hour five minutes, amount used 5 oz., pupils moderately contracted, reflexes absent; post-operative—vomited to a large extent three times during the evening, no cough; observation—the anaesthetic proved very successful in every way, the pulse remained strong, and the haemorrhage was moderate and easily controlled; conclusion—a successful form of anaesthesia for craniotomy cases.

DISCUSSION ON INSUFFLATION ANAESTHESIA.

Dr. P. Fiaschi (Sydney) showed the operation of opening both sides of the chest in a dog under his insufflation method. About one hundred doctors were present.

Both lungs were shown in the opening. The lungs were "partially" collapsed, and appeared to be of a bright pink-colour, showing oxygenation to be going on. The gap in the chest-wall on either side was a large one, being kept open by retractors, and on the right side by osteoplastic resection of two ribs.

The operator, however, had no proper aseptic operating-room in which to do the work.

The other three dogs that were operated on with due aseptic conditions were shown, and looked bright and hearty, and both operator (Dr. P. Fiaschi) and dogs received applause.

Dr. FIASCHI pointed out the usefulness of his method in various operations. He brought with him one nurse and two male assistants who administered the anaesthetic.

Mr. SYME said that four years ago he had used a somewhat similar apparatus, and removed a large sarcoma from the chest in a man. He also used it in a hydatid case.

Dr. HORNABROOK spoke also, saying that there was a risk of it being used rashly, and in any case the operator should try it first on a dog.

Dr. GORDON-CRAIG (Vice-President) spoke of the value of intermission of the insufflation now and again to allow of CO_2 being eliminated.

Dr. P. FIASCHI replied, and called attention to the use of Meltzer's apparatus in cases of tetanus. In a case of respiratory failure in Sydney Hospital he had tried Meltzer's method with an ordinary bellows successfully. He then turned on the electric current, and showed the apparatus working.

Dr. Anstey Giles (Vice-President) was in the chair at the time, as Mr. Hamilton Russell was absent in the Children's Section, opening the " Hernia in Infants " discussion.

SURGICAL DEMONSTRATIONS AT AUCKLAND HOSPITAL.

(320 BEDS.)

AT 8.15 a.m. on Tuesday, Wednesday, and Thursday, three of the Honorary Visiting Surgeons, Messrs. Gore Gillon, Robertson, and Kinder, gave demonstrations of surgical cases and operations at the hospital, and in one abdominal case Dr. P. Fiaschi's method of anaesthesia was used with great success.

DIAGNOSIS AND TREATMENT OF TUBERCULOSIS OF URINARY TRACT.

By GORDON CRAIG, M.Ch., Sydney,

Honorary Surgeon, Royal Prince Alfred Hospital, Sydney, Lecturer on Clinical Surgery, University of Sydney Medical School.

THE eye of the surgical world has had this subject of urinary tuberculosis in focus for the past ten years, but more particularly during the past five.

My remarks will be confined to a short review of the main facts of the surgical pathology, followed by a discussion of the treatment, concluding with a further discussion as to whether, on the evidence before us at the present time, this treatment should be medical or surgical. It is the intention of the other speakers, I believe, to take up the aspect of diagnosis.

Until recent years it was thought that tuberculosis of the urinary tract was an ascending process from the bladder, and that this organ was either the primary seat of the disease or was secondarily infected from the genital organs—viz., the prostate or seminal system. We now know by precise methods of diagnosis that infection of the bladder from the genital organs does occur, but primary tuberculosis of the bladder is practically unknown. It can be said almost without reservation that urinary tuberculosis is a descending process from the kidney. It follows, therefore, that a discussion of urinary tuberculosis is a discussion of renal tuberculosis.

The kidney is one of the great scavengers of the blood, and in the exercise of this function it normally excretes the bacilli. In disease the tubercle bacilli are carried by the blood-stream and are arrested in the arterioles of the glomeruli, or those lying between the tubules. Sometimes the invading organisms come to rest in the tubular epithelium—what might be described as the very back door-step of the body. One can picture the tired opsonins and leucocytes exchanging glances of mutual congratulations at having seen the enemy thus far out of the house. One can even forgive them for resting with a feeling of well-earned security. Yet the security is false. Even there the organisms can turn and change an apparent defeat into a triumphant bacterial victory.

Having settled in the kidney, the characteristic tissue reactions take place- the formation of the tubercle, followed by the well-known sequelae of softening, caseation, abscess-formation, and local extension. This ends eventually in complete destruction of the organ—the so-called caseo-cavernous kidney familiar to every surgeon engaged in this work.

All authorities are agreed that with the evidence at hand this is the usual and regular termination of the disease. When a case of tuberculosis heals it does so by closing up the infected and strictured ureter, and thus shutting off the kidney. This process well deserves the name of "auto-nephrectomy." We must at present share the view expressed by Howard Kelly that "the only healing definitely known is when the kidney is entirely destroyed and its ureter occluded. Such is rare, and always open to the possibility of a lighting-up of the infection."

That this is always the case I cannot believe. We have absolute evidence of healed tubercle in the old scars at the lung-apices. So I feel sure that extended observation will prove that an analogous process occurs in the kidney. Admittedly on present evidence it is rare, but it must occur; otherwise it would be impossible to explain some cases of cure in the early stages of the disease, confirmed by subsequent cystoscopic and bacteriological examination. Many of these early cases must become infected and recover without ever coming to a surgeon or physician for advice. Further, healing of tubercular foci without caseous degeneration or abscess-formation occurs in the brain, in bone, in lymph-glands, in milk-glands, and in the serous membranes. The question, therefore, from a scientific standpoint, as to whether it also occurs in the kidney, is in the position of the Scotch verdict—"not proven."

Since writing the above, Braasch offers some autopsy findings which go to prove that this favourable termination can take place.

Long before the complete desstruction of the kidney occurs one or more of the tubercular foci in the kidney softens, and ulcerates through the pyramid and communicates with the kidney-pelvis. Coincident with this process there is an escape of tubercular bacilli, and sometimes blood, into the urinary stream—quite analogous to the course of tuberculosis in the lungs. Careful pathological examination of a 24-hour specimen of urine should show the organisms there. On this fact depends one of the most valuable tests of the disease, and, if positive, is a pathognomonic sign, with two exceptions: firstly, the urine may contain tubercular organisms excreted by a healthy kidney from a focus in some other part of the body, or, secondly, the organism may come directly from a tubercular prostrate or seminal vesicle. These exceptions are rare, and furthermore the bacilli when excreted by a healthy kidney are unaccompanied by the usual pus-cells and red cells.

With the continued outpouring of bacilli from the kidney, first the pelvis, then the ureter, then the bladder, and finally the second kidney becomes infected.

It is a reflection on the present general standard of clinical knowledge that the majority of cases that reach the surgeon do so only when the bladder has become extensively involved, or even perhaps the second kidney.

Just as in lung-tuberculosis, the disease involves at first only one side. This fact governs the whole principle of surgical treatment. Early recognition means a high proportion of recoveries; *vice versa*, late recognition means a high proportion of deaths, be the treatment medical or surgical.

With the means at the disposal of every practitioner an early diagnosis can, with a little care, be arrived at or suspected. It is surprising what a number of cases of chronic cystitis, uninfluenced by ordinary treatment, turn out to be cases of urinary tuberculosis.

The advance of the disease and its communication with the urinary tract by ulceration through the pyramid is the classical or usual method of extension. There is, however, another way. The focus may be near to and involve the capsule of the kidney, or from there extend into the perinephric tissues. The first sign of the disease in some of these cases is a perinephritis or perinephritic abscess. Seldom, however, when this occurs, is it a pure infection of tubercle bacilli. The *Staphylococcus* or *Bacillus coli*, or both, usually add their weight to the patient's already big burden of intoxication. So much may the other organisms participate in the nephritis or perinephritis that the true nature of the disease may be overlooked. A tubercular perinephritis is not rare, but a tubercular perinephritis, unaccompanied by bacilli in the urine, is extremely rare.

I have a series of lantern-slides prepared from advance illustrations of Howard Kelly's new book, now in the press, on "The Surgery of the Kidney." They were given me by the author, and I wish to place on record my appreciation of his courtesy to a stranger from a far country.

I would also draw your attention to the name of the artist, Max Brödel—the man whom we all have to thank for lifting the standard of medical and surgical illustration to its present high level. The privilege of meeting him in his studio and at work was amongst the most enjoyable and instructive experiences of a recent journey.

From this brief review of the pathology the principles underlying the diagnosis and treatment of this disease can be readily understood.

A general diagnosis of urinary tuberculosis can be arrived at by the clinician in the great majority of cases, but treatment nowadays requires more than this—it demands localization of the focus of disease in the urinary system. Whether the disease is unilateral or bilateral can be ascertained only by cystoscopy and ureteral catheterization, unless the surgeon is prepared to expose both kidneys at the time of operation. It must be admitted that in a certain number of late cases, owing to extensive ulceration of the bladder, catheterization of the ureters may be impossible, but, with these exceptions, is it not unjustifiable to expose a patient to the risk of a double operation?

The question, "Is urinary tuberculosis a medical or surgical disease?" is emphatically answered by Wildbolz and Rafin in their recent contributions to the literature of the subject. When unilateral, it is surgical; when bilateral, medical or non-operative.

The fact must not be overlooked that the evidence of these two observers was gathered in Europe—viz., Switzerland and France—where the conditions of life are more severe than in Australasia. Climate, housing, wages, the price of good food, all join hands in making the task of recovery a harder one. In bone-tuberculosis our experience in Australasia tells us that there is not the relative number of cases, nor do we see so often the grave manifestations of this trouble. For example, amyloid degeneration of the liver and kidneys, as a complication of advanced tuberculosis, is almost unknown in this part of the world. Perhaps extended observation will show that this lessened severity may also hold true for tuberculosis of the kidney.

Wildbolz and Rafin have proved their case for European countries. We shall have to prove with similar accuracy that Australian conditions are more favourable before we can logically differ from them.

An abstract of Wildbolz' evidence is the following:—

In a series of 316 cases treated by non-operative measures, with no case under observation for less than two years, 218, or 70 per cent., were dead at the time of inquiry; 98, or 30 per cent., were alive. The majority were dead inside five years from the onset of symptoms. In another series of fifty-eight, twenty-nine had a bilateral and twenty-nine a unilateral affection, as ascertained by cystoscopy. Of the *bilateral*, twenty-two were dead—*i.e.*, 76 per cent.; seven were alive—*i.e.*, 24 per cent.; of the *unilateral*, ten were dead—*i.e.*, 34·5 per cent.; nineteen were alive—*i.e.*, 65·5 per cent.

Rafin has 168 personal observations, and they tell the same story—Dead, 91, or 53 per cent.; alive, 77, or 47 per cent. The majority in this series also were dead before five years had elapsed.

For records of this kind, in estimating the length of time the disease has existed the term "onset" is synonymous with the onset of symptoms, although it is obvious that the disease must have existed for some time before the symptoms developed.

An analysis of their figures shows that the disease is more severe and runs a more rapid course in men than in women. When we consider the anatomy of the urogenital organs in the two sexes the reason of this difference is not hard to seek. In women the two systems are separate; in men they have a common outlet.

Do not these figures tell a graphic story? What goal awaits the greater part of these poor sufferers? A lingering death removes them from their tortures. Unlike the disease on the other side of the diaphragm no bright *spes phthisica* helps them on their journey, but in its place a helpless, hopeless melancholy—a longing for the end. Day and night, night and day, the ever-present sense of bladder-fullness tempts the sufferer to gain relief by micturition, though long experience tells him the falseness of such hope: he knows too well the burning pain of strangury and tenesmus will meet him in its stead. Truly, death is a friend to such as these.

There are a few, but only a few, who keep the health to do their daily duties, and fewer still who really do get well.

This is the story under non-operative treatment. Sun bathing or heliotherapy, tuberculin, Röntgen rays, all claim their victories in individual cases; but many of these records fail to convince, owing to the absence of scientific proof. The causative bacillus had not been demonstrated.

In reading both sides of any question of treatment we must keep in mind the unconscious bias of the surgeon and physician. Each sees too many of the other man's mistakes and not enough of his own.

I have the records of two cases treated by non-surgical methods. A farmer, aged forty-three, was referred to me three years ago by Dr. Bickerton Blackburn. I found he had bilateral tuberculosis. The right ureter had a stricture just outside the bladder-wall, impassable to a No. 5 catheter. The left ureter emitted clear urine freely, but a specimen taken by ureteral catheter showed one clump of tubercle bacilli. A year later he came under my care again for tuberculosis of the tarsal bones. In addition to ordinary general treatment he had injections of old tuberculin for some two years. He is now working on his farm, and is in good health, although troubled slightly with his water. His urine still contains bacilli, but very few when compared to the numbers present three years ago.

What has happened in his case is a natural nephrectomy. The stricture in the right ureter has sealed off the kidney, which is no doubt destroyed by that caseo-cavernous change already referred to under the pathological review.

Mr. I., aged thirty, a fireman on a Sydney Harbour ferry-boat, seen three years ago, had early tuberculosis of his right kidney. Only very few bacilli could be demonstrated in the urine from the right ureter, and the left was quite clear. He went to a farm in the country for only three months, and before he left he had gained a stone in weight, and was able to work in the fields. For two years he has returned to his work as fireman, and he has lost all symptoms. A bacteriological test made in January, 1914, showed no organisms.

These two cases show that perhaps in Australasia our results from general treatment may not be so unfavourable as in Europe. We must remember that here every one is a millionaire—not in cash, but in what Treves has so aptly called "the uncoined wealth of sunlight and fresh air." We have not the extremes of climate, and good food is not too dear.

As against these favourable results, the great majority whom I have personally observed have advanced to chronic invalidism or a lingering death.

From what has been said under "pathology" it is obvious that the surgery of urinary tuberculosis is the surgery of renal tuberculosis. Nephrectomy can be of service when the disease is one-sided, and the service is greater the earlier the disease is recognized. Partial nephrectomy has been abandoned, as useless or even harmful. All experience goes to show that opening the bladder is wrong, and that only harm will arise from any such step. As a rule, a dribbling tuberculous fistula is added to the patient's already overflowing cup of suffering. Some fifteen years ago this step was taken in a patient of mine, with disastrous results. This fact is mentioned with emphasis, as even yet a perineal or supra-pubic cystotomy for drainage is lightly undertaken in a case of chronic cystitis. Irrigation of the bladder only aggravates the disease, although a few surgeons still use weak carbolic injections.

The first deliberate nephrectomy for renal tuberculosis was undertaken by Peters in America in 1872.

In 1885 the immediate mortality of the reported cases was so high—viz., 40 per cent.—that Morris quite rightly questioned the propriety of the step. Steinthal, in the same year, however, showed in a series of autopsies that in twenty-four cases of urinary tuberculosis the kidney was involved in every case, and in 50 per cent. of these the ureter and bladder were involved as well. In nine the kidney alone was infected.

From this date surgeons boldy set themselves out to do nephrectomy in unilateral disease. At the present day, amongst many noted surgeons, Wildbolz and the Mayos have series going into hundreds, with an immediate operative mortality of less than 3 per cent. By immediate mortality is meant death in hospital.

Israel collected, up to 1911, 1,023 cases, and the mortality in the first six months was 12·9 per cent.

The ultimate outlook as gained from the records of many prominent surgeons shows that 70 per cent. recover, but not all with a freedom from evidence of tuberculosis.

Israel showed in 170 of his own cases that 63·8 per cent. were free from tubercular bacilluria.

Unless observations are made for at least three years after operation the results are not of much value, and for this reason my personal cases are too small in number to justify any general conclusions. At a later date it is my intention to record them. One case in particular, however, is worth quoting: A man, aged ——, had a nephrectomy done three years ago for a left-sided renal tuberculosis and extensive ulceration of the bladder. He is now free from all symptoms, and his urine is free from bacilli.

Of necessity the time is limited in a discussion of this character, and beyond the main facts little else can be touched upon. To sum up, there is no doubt that the evidence at hand is overwhelming in favour of surgical treatment of urinary tuberculosis, provided the diagnosis is made early enough.

There is some likelihood that extended observation in Australasia may prove that the treatment of urinary tuberculosis under general or non-operative measures may be much more favourable than the recorded observations in Europe.

REMARKS ON THE DIAGNOSIS OF GENITO-URINARY TUBERCULOSIS.

By Julian Smith, M.D., M.S., B.Sc.

It is not intended to bring forward on this occasion any new ideas, such as would interest the past-masters in genito-urinary surgery, but rather to consider important points bearing on the diagnosis of tuberculosis of this region.

It would be better even to say the *early* diagnosis of such cases, because of the vast importance of prompt and early treatment. Regrettably, however, this is more often desired than attained.

As a rule, then, the onset is insidious, just as with tubercle elsewhere in the body, and the indications are often elusive in the extreme, but when a patient with a poor family-history becomes lowered in health in a vague way the genito-urinary system must not be passed over until exhaustively considered. Thus, pain or ache, not necessarily severe, in the renal region (costo-vertebral angle or loin), disturbances of micturition, not necessarily marked, renal enlargements, thickening of the vas or epididymis (gonorrhoea being absent), painful or bloody nocturnal emissions, irregularities in shape or consistence of the prostate or vesicles, should all be sought for. Above all, the urine must have the closest attention ; one must not be content to see a clear urine reacting normally to chemical tests, nor even regard lightly a mere trace of albumen, but must also look microscopically for red cells or pus-cells and become proportionately concerned if they are found.

It is wise to insist on the importance of not resting content with superficial examination in such cases. We know and feel that life is short, especially at this class of work ; and, also at this work, that the art is very long ; and it needs considerable patience to examine specimen after specimen in doubtful cases, and when, as often happens, some improvement occurs with the treatment adopted the temptation is great to slur the diagnosis and hope for the best in this best of worlds. These remarks apply even more strongly to cases where tubercle is already recognized elsewhere in the body.

As illustrating the difficulties of definite diagnosis, the following may be quoted : A slim girl, somewhat anaemic, and looking like many a mild tuberculous patient, became feverish and went to bed after two or three days with "influenza." Her temperature was then 103° F., and subsided in a few days to normal. Concurrently there was tenderness and aching in the right loin, frequent micturition, and pus in an acid urine. The right kidney was palpable and tender. Rest in bed cleared up all the symptoms, and six weeks later the examination of the urine showed a clear urine, in which, however, microscopic blood was present on repeated examination. The X-ray showed no stone. The cystoscope showed a clear normal bladder. Both ureters pumped well ; the right one bled freely on catheterization ; the left specimen also had red cells, possibly from trauma, so that the origin of the microscopic blood was not certain. Repeated examination showed no tubercle bacilli or other organisms, and cultures were negative. The Von Pirquet reaction was most violent, and the family history markedly tuberculous. Some four years previously, she said, she had an attack of pain in the right hip, which was treated by complete rest in bed for six weeks. She arose relieved. There is no present sign of hip-joint trouble. The question arises most persistently whether she had a focus in the right kidney, and whether the fever was due to temporary increased activity in it, followed by quiescence and without discharge of bacilli, for specimens from both kidneys and the bladder were injected into guinea-pigs with a negative result. Under rest and appropriate diet this patient gained colour and weight, and has for six months quite lost the tenderness and aching in the loin, and the red cells have disappeared from the urine, and one is only now beginning to feel satisfied about her. Any return of the troubles would call for a prompt and thorough examination with a view to exploration of the kidney.

To continue, we may say that one salient feature is outstanding as a rule, and that is *chronicity*. Slight exacerbations of symptoms are followed by periods of quiescence; and often it is only after years, when certainty of diagnosis is established, that the explanation of many preceding vague symptoms is made. Often enough during the whole of this time the sufferer may have satisfactorily carried on his daily work. How, then, can he be warned earlier, and perhaps saved much suffering?

Let us begin with *urine-examination*. *Albuminuria* as an early sign has been mentioned. The question of this being postural or functional, or due to one or other forms of nephritis, must be gone into; but, with failing health, the absence of obvious cause, and with a tuberculous family history, this sign must be viewed with suspicion. The Von Pirquet test may help; one is accustomed, however, to ignore its findings altogether unless it is grossly positive. Then ureteral catheterization is justifiable. The finding thus of one-sided albuminuria is very significant, and carries forward the diagnosis to the stage of keen suspicion of one kidney, and to the question of early exploration of the kidney if general improvement is not marked. *Per contra,* it must not be assumed that absence of albuminuria or pyuria disproves disease, for a focus may cease discharging for a time, or a ureter may become blocked.

If, again, the routine examination results in the finding of red cells in the urine we are met with the same difficulties. Are these red cells from the urethra, prostate, or bladder? If examination excludes these and points to the kidneys, catheterization will help to a decision. Trauma by catheter is apt to mask the finding, so that more than one attempt may be required. The source of the blood may be bilateral, when tubercle is then unlikely, and nephritis or general dyscrasia be favoured. But this class of case, with some symptoms necessitating careful urinalysis and the finding of red cells, belongs to the most puzzling that one can meet. One has to bring in review in turn crystaluria, stone, early tumour, the various dyscrasiae, including blood-diseases, and all the causes by pressure from without on the urinary tract, urinary kinks and obstructions, including renal mobility, and other inflammations besides the tuberculous.

With definite *microscopic haematuria,* again, the same considerations apply. It may be the first symptom manifested. The origin of the blood must be discovered. As an example: In a man recently seen it was certainly prostatic, bright-red blood appearing at the end of micturition, the bladder being normal to cystoscopy. The prostate then was not appreciably abnormal per rectum. There was no active sign of tubercle elsewhere, but there had been a pleurisy, with tapping three years previously. After six tedious examinations some tubercle bacilli were found in the last urine passed. The Von Pirquet reaction was extremely marked. In two months there was a painless swelling in the left epididymis, and the prostate showed some nodulation. There has been no apparent kidney-involvement. The cystoscope, in addition, will decide whether the bladder is the source of the blood, and, if so, the tuberculous nature of the lesion. If of renal origin, it also points to which kidney is affected. The diagnosis may now be settled out of hand by the finding of tubercle bacilli, or a radiograph may show a stone, or, again, an increasing swelling, with much haemorrhage, makes tumour likely and operation imperative, or the presence of tubercle elsewhere makes the nature of the renal lesion highly probable, and operation more or less advisable; but in addition to these there is a residuum of cases of haematuria which tax the diagnostic ingenuity to the limit. Some are never solved—that is to say, the renal haemorrhage continues for a variable period, ceases for good, and health is regained. Some are undoubtedly nephritis, some due to bacilluria, some to renal mobility. It is with anything but a light heart that one lets these cases go on, but it is only after most rigid search, guinea-pig test, and even tuberculin test, have been made, and then always with the strongest warning to the patient to report at once if further signs appear.

Next, pyuria is often for some time the only indication of urinary tubercle. There may even not be any appreciable disturbance of micturition. When investigating such cases it must be remembered that in ordinary suppurative conditions the causative organism is easily recognized by the simplest staining methods within the reach of every practitioner, so that if he encounters a persistent pyuria without organisms he should suspect tubercle, and take prompt measures to have the case thoroughly investigated. Very many instances could be quoted in which the distress-signal has been flying for long periods unrecognized, or at least ignored. The following is a typical example: Under the care of Dr. Murray Morton, in our St. Vincent's Hospital clinic, a man of forty had a sharp haematuria nine years previously. He recovered completely, but within a year began to have both noctural and diurnal frequency and some aching in the left loin. These, however, were never severe, nor sufficient to prevent work. He admitted on close inquiry that his urine was turbid when passed on many occasions during the whole period up to the present. He saw medical men on and off during this period, and beyond question his condition was perfectly recognizable throughout. This did not occur, however, and he only came into the surgeon's hand for an enlarged left testis, which in the last few months had suppurated and was causing inconvenience. A proper examination disclosed an extremely diseased prostate, a thickened ureter with circum-meatal ulceration, left-sided pyuria with bacilli, and a clean right side. His left kidney and testicle were removed, and his improvement was very satisfactory. Troubles of micturition have vanished, his urine is practically clear, and he is gaining weight and strength, but he still has a tuberculous prostate. Beyond question, this is a case of left primary renal tubercle, secondary prostatic and tertiary epididymal infection; and an earlier recognition of the renal state would have prevented the other two by a timely nephrectomy. Still, it must not be forgotten that a tuberculous case is masked at times by a secondary infection, and other considerations must then be brought in to help in elucidation. Treatment, for instance, may clear up the secondary infection, and the pyuria may persist, so that further search must be made for tubercle bacilli. I have always wondered why the guinea-pig is a better indicator than the microscope in this matter. I think it is because insufficient material passes under the eye. In the search for bacilli, a pint or two of a 24-hours specimen of urine should be allowed to sediment for some hours, and a goodly portion of the lower part be centrifuged; the sediment is washed and the whole of it smeared, fixed, and stained. A vernier stage should now be used in a systematic examination of the whole of the deposit. This is tedious, requires many rests, but is more often successful. Rovsing says he is successful in 80 per cent. of examinations. My impression is that very few can say as much, though I think that the longer tedious trials are oftener positive.

Disturbances of micturition naturally take a prominent place in the clinical picture of genito-urinary tubercle. It is one of the greatest moral certainties of life that a young man presenting increased frequency by night as well as by day without obvious cause (such, for instance, as gonorrhoea) is a case of genito-urinary tubercle. Further examination usually shows a deposit in epididymis or prostate, or the cystoscope discloses indubitable bladder signs. Then, again, it is not rare to meet cases where gynaecological causes have been accredited with this irritable bladder-condition. I can recall two where a simple vaginal examination disclosed a thickened lower ureter, and this, in conjunction with the typical facts in the history, practically settled the diagnosis before actual confirmation by the cystoscope and urinary findings.

The pains caused by genito-urinary tubercle demand some study. Often enough there is just some aching in one loin, improved by rest. Typically, also, some evening rise of temperature is present, with perhaps some sweating and slight ill-health, and the diagnosis is only a suspicion, made certain later by the appearance of one-sided pyuria arising when the lesion breaks down. But the pain sometimes increases to a definite renal colic, with haematuria or pyuria, or both. I recall a typical example in a man who, six years before being seen, had classical right-sided renal colic with haematuria. His medical adviser told him he had a stone. No X-ray was taken, and, as the pain cleared up, the patient went about his duties. When seen six years later he presented the well-marked evidences of bilateral general genito-urinary tubercle, including bladder, prostate, and testes; and yet the whole past history then given graphically mapped out the advance as first a descending right-sided disease, then bladder-involvement, with prostatic inclusion, and ultimate spread to left kidney and testes, all in definite sequence. He died soon after from uraemia. I think his condition was capable of diagnosis five years before (for he had right lumbar ache and pyuria), when the disease was operable and curable. This case can be contrasted with another more fortunate one of a woman of fifty with indefinite right-sided abdominal pains on and off for three or four years. She presented an old appendical scar, but, despite this, was still suffering in the same way. Even then her report suggested an abdominal condition rather than a urinary one, but a routine examination disclosed a pyuria, which ureteral catheterization showed to be right-sided. Exploration disclosed a large kidney and thickened ureter, and removal resulted in cure of her symptoms. The microscope showed the whole kidney to be tuberculous. This was a rather inactive, slowly progressive case, and the bladder had escaped.

In considering the diagnosis of genito-urinary tubercle it is quite important to hold in mind the intimate anatomical relationship of the various units in the system. Thus the kidneys send an excretory stream from every portion of their substance to the ureter, bladder, prostate, and the exterior. The testes through epididymes send a secretory stream to vesicles and prostate. Further, Walker, in experiments on the urethra of guinea-pigs with the *M. prodigiosus*, was able to recover these organisms from the globus minor in a few hours after inoculation.

The vas was sterile, thus showing that infection spread by the lymphatics from urethra to epididymis, and again in an equally short time they could be found in ureteral wall and kidney-capsule. The blood was sterile. This throws a flood of light on the lymphatic inter-relations of the organs, and gives more food for thought on methods of spread of infection. Thus a small and almost mastered primary renal lesion may ultimately affect the dependently placed and delicate prostatic mucosa, with its numerous inviting crypts, through the agency of the urine. And here a readier soil may be found, where bacilli multiply and are shipped back via the lymphatics to ureter and kidney-capsule of both sides, with a sure and steady rear attack on these organs. Or perchance a mild renal and secondary prostatic lesion may hand on trouble to the globus minor, where a great flare of disease constantly pours back via the vas a flood of infecting material to the vesicles and bladder, perhaps causing sinuses in urethra, perineum, and scrotum. We cannot foresee in which direction the attack will be fiercest, but all these must be constantly held in mind in studying a case, and efforts be made to prove or deny their existence. If the brunt of the attack has only yet fallen on the kidney close inquiry should be made into symptoms relating to, and careful examination should be brought to bear on, lower ureter, prostate, vas, vesicle, and epididymis. *Per contra*, a slowly oncoming practically painless nodule in an epididymis is rarely primary, and should direct attention to prostate or kidney at once. Of all methods for this purpose, the use of cystoscope and ureteral catheters holds premier position, and is indispensable. Though usually reliable, however, it is not infallible. It is said, for instance, that bladder-tubercle, practically always secondary, selects the portion nearest the primary site, trigone in prostatic, circumureteric in renal infection. But there are exceptions. That diagnosis even thus is not always plain sailing the following case shows: An unmarried woman of forty-one first became ill, in her opinion, fifteen months previously, but at once insistent inquiry elicited the fact that she had lost 4 st. in weight, extending over a period of five years. Nevertheless, she considers her first sign of trouble was an attack of pain in the bladder and difficulty and straining in passing water, of three days' duration, fifteen months ago, though there has been some left-loin ache on and off for two years. She was quite well thereafter until nine months ago, when a sudden return of these symptoms ushered in a period of intermittent haematuria and pyuria, for which she ultimately consulted her doctor, who, immediately recognizing the need for full investigation, sent her to town. It is interesting to note here how her report needs revising, because on insistent inquiry she finally admits having to get up twice at night to pass water for some three or four years, but she had become so used to this that she regarded it as unworthy of mention, especially as there was no pain. At the present time the pain is mostly suprapubic, radiating thence to left loin. The routine examination disclosed an acid pus-laden urine, with tubercle bacilli. There was extensive bladder-ulceration mostly around the left ureter, the meatus of which was a vast crater, and entered by catheter with difficulty, and guided only by the emerging stream of indigo carmine previously injected hypodermically; the urine was pus-laden, and showed bacilli. The right-sided specimen had far fewer pus-cells, showed no bacilli, and the meatus was normal. Though the left kidney could not be palpated, there was some tenderness along the ureter, which was felt to be greatly thickened per vaginam, the right one being normal. The case was looked upon as one of left descending type, and was explored with a view to nephrectomy. I was surprised, however, to find a normally-sized smooth pliable kidney, and a thin pliable apparently normal ureter, so far as it could be seen in this region, and I could not bring myself to an excision under the circumstances. I therefore was content to sew up and resort to the use of local bladder-treatment, after the manner of Rovsing, with 6 per cent. carbolic. I must say that I have been surprised at the improvement in this case, for the pyuria is practically gone, and the bladder-lesions are healing. Of course, the ultimate outlook is uncertain, considering the 2 in. or 3 in. of thickened tuberculous ureter. Dr. Arthur Morris quotes to me an exactly similar difficulty ; he actually split the kidney, and saw nothing to justify excision. Besides these difficulties of interpretation, others of another type arise, where it is impossible to catheterize the ureters owing to extensive ulceration and distortion, or extreme irritability or haemorrhage of the bladder, and here Rovsing recommends double lumbar incision to complete the diagnosis.

The question arises thus whether one is not justified in the above two cases in exploring the other kidney, and, if it were found quite healthy, to deviate the urinary stream to the loin on the side of the ascending tubercle until this had by rest of function recovered, and, failing this after due trial, to nephrectomize. It is debatable ground, and worthy of much thought in endeavours to make the best of a bad job.

Before concluding, one or two words about genital tubercle are appropriate. Purulent urethral discharges resembling gonorrhoea occur, and may arouse unwarranted suspicion in the celibate. They have only to be remembered, to be recognized by the accompanying signs. It is not customary to find bacilli easily, but I have encountered one case where there were numerous typical acid-fast bacilli in the discharge and nodules in the prostate. I unfortunately failed to inoculate a guinea-pig. But besides this, it must always be remembered that former gonorrhoea, or its still persistent sequelae, is apt to create a *locus minoris resistentiae*, where a typical genital tubercle may develop ; and though bacilli may not be demonstrable, I have been able to render the tuberculous nature of some of these old indolent gonorrhoeas practically certain some years ago by a series of opsonic estimations, made before and after prostatic massage.

In conclusion, one feels that the subject of the diagnosis of genito-urinary tuberculosis is rather difficult to handle succinctly. Early diagnosis is imperative. On the other hand, early signs are elusive, and constant vigilance is necessary, or they will be overlooked or their significance minimized.

DISCUSSION.

Mr. SYME mentioned the dangers of cystoscopy in inexpert hands.

Mr. SAVAGE mentioned that infection of the kidney by a sporothrix was another cause of haemorrhage and pyuria, and symptoms which strongly simulated tuberculosis. He disagreed with a general statement that if tubercular disease existed in both kidneys it was always to be considered a contra-indication to operation, and quoted a case in a woman of extensive tubercular disease of left kidney and of the bladder, round the left ureteric orifice, in whom the tubercle bacillus and a small quantity of pus were present in the urine from the right kidney. In this case the left kidney was removed, and the ureter fixed in the loin to allow of injection of iodoform emulsion into the bladder. Now, after three years and a half the patient was in good health, the bladder had healed, and the urine contained neither pus nor tubercle bacilli. He considered that if the disease was very extensive on one side and but slight on the other, then the patient should be given the chance of the slightly infected kidney recovering under the better conditions of health which followed removal of the main focus of disease.

Dr. MILLS said the pus settled in the bottom of the vessel in pure pyuria, whereas in cases of *Bacillus coli* infection the urine is turbid all over. The tubercle bacilli settle down with the pus at the bottom of the vessel. He had found tubercle bacilli in urine cases of infective endocarditis and other diseases, therefore why remove one kidney? Vaccine treatment he had found disappointing. The use of albumin water on the microscopic slide made the examination of pus easier.

Dr. T. FIASCHI and Hon. Dr. NASH also spoke.

Mr. HAMILTON RUSSELL (President) asked, why should the kidney be the only organ not to recover from tuberculosis? Pain comes on late in renal tuberculosis, and it is generally very late in the history of the disease that the patient consults his doctor.

Dr. GORDON CRAIG briefly replied.

SUBCUTANEOUS INJECTION OF ATMOSPHERIC AIR IN FIBROSITIS AND ALLIED AFFECTIONS.

By ALEXANDER DOUGLAS, M.A., M.D., C.M. (Edin.).

THE medical man has another function to perform than that of diagnosing and curing disease. He is expected to serve his day and generation by relieving pain. The former bulks largely in the eye of the practitioner; the latter often fills the vision of the patient.

There are a number of cases met with in practice where the prominent symptoms are pain and local tenderness referred to the voluntary muscles, tendons, aponeuroses, and fasciae of the body.

After a careful search for lesions in the various viscera which may account for such pains reflexly or sympathetically, one is still confronted with a common type of case where the pain appears to have its origin in the muscle or fibrous tissue.

Various terms, such as "lumbago," "muscular rheumatism," "neuralgia," "myalgia," and "fibrositis," are applied more or less loosely to these conditions. Their pathology is equally indefinite, and it is likely that various allied phenomena are produced by different pathological lesions. For the majority of such cases Sir William Gower's term, "fibrositis," indicates the lesion which is most acceptable in theory, and his address on "Lumbago and its Analogues," in 1904, marks an advance in our knowledge of the matter.

Luff's recent papers express the present view as to the pathology, but there is much yet to be made clear. Our lumbago cases do not frequent the post-mortem room, or their backs do not clamour for investigation after death. It suffices for present purposes to adopt the view that a hyperplasia of fibrous tissue occurs in this type of case. Fibrous nodes are palpable in such well-marked cases as are given the name of "brachial neuralgia," and a chronic exaggerated form is well known as "Dupuytren's contraction." It seems likely that in lumbago and "stiff neck" some similar but slighter lesion is present to explain the phenomena, and that the inflammatory hyperplasia of fibrous tissue is capable of spreading into the sheath of the sciatic nerve and other neighbouring tissues.

If this is the origin of lumbago it predicates the fact that acute lumbago is not really so sudden as it would appear ; and, in truth, careful observation shows that usually there are premonitory symptoms in the back before the sudden stab of lumbago is precipitated by some movement after rest.

The methods of treatment are legion. The mind of the great army of the stiff-backed is infested with cures ; and every bullet of up-to-date therapeutics, hot or cold, wet or dry, from electrons to irons, finds a billet in fibrositis. Drugs, rest, massage, local applications, and counter-irritants prove serviceable occasionally, and sometimes remarkably so ; but even those most highly praised are often only partially and temporarily effectual, or require prolonged use. The technique of some recent forms of treatment, such as ionization, is not of the simplest.

A method which is simple, applicable in every case, and, in the author's experience, more uniformly successful in relieving pain than any other is that of subcutaneous injection of atmospheric air.

The method was advocated in France in 1904, but does not appear to be well known to the profession generally. It is not even referred to in many well-known English and American text-books, nor was it mentioned in the "Discussion on Fibrositis and Muscular Rheumatism" at the meeting of the British Medical Association last year.

Yet the treatment is safe, gives prompt relief, and does not require frequent repetition. The technique, too, is simple, the only apparatus required being a hollow needle and a rubber bulb with tube attached. After using this method some hundreds of times during the last eight years, the author recommends it strongly to his brother practitioners.

The method of application is as follows : A hollow needle, which for convenience should be larger than an ordinary hypodermic needle, is used. A platino-iridium exploring needle, such as is frequently provided with a hypodermic case, proves very suitable, and it can be quickly sterilized in a flame. A bulb and tube, such as used for any ordinary throat-spray, is attached to the needle. The rubber part of the "Glaseptic" nebulizer, for instance, is very serviceable. A wisp of wool was originally inserted into the tube where it was attached to the needle, in order to filter the air introduced, but experience has proved this precaution to be unnecessary, as infection never occurs. After sterilizing the needle, the skin and fat are picked up and the needle is thrust well into the cellular tissue, as in giving a subcutaneous injection. The needle is then withdrawn a little to avoid the least risk of inflating a blood-vessel, and air is pumped into the cellular tissue ; an emphysematous tumour is thus produced, and the air can be seen to course through channels under the skin, this latter appearance varying greatly with the individual and the site. As air is slowly pumped in, the left hand manipulates and distributes the air throughout the whole area affected. The amount of air to be used cannot, of course, be accurately measured, and must be judged by experience. The cushion of air in the lumbar region, for instance, should often be as large as that produced by a pint of saline. A tympanitic note over the whole affected part is desirable, and in the case of a large hip and thigh, that requires a considerable quantity of air. After withdrawing the needle it is good practice to keep on massaging vigorously for a few minutes, so as to distribute the air thoroughly, moving it backwards and forwards through the tissues. It is sometimes necessary to introduce the needle in more than one place, on account of well-defined deep attachments of fascia limiting the air to certain subcutaneous spaces ; for instance, such boundaries are well marked at the middle line of the back, except about the sacrum, where air can usually easily traverse the mid-line, and again at the gluteal fold.

Very little pain is caused by the measures described, beyond the introduction of the needle, and the patient almost invariably experiences immediate relief from his symptoms, and rises to move himself with much greater freedom. Some tenderness of the skin occurs a few hours later, and its degree is partly dependent upon the vigour of the massaging and the amount of air used. Due regard should therefore be paid to the sensitiveness of the individual, especially at the first application.

The air remains in the tissues for several days, and is gradually absorbed.

In a large series of cases no serious consequences have been observed. The only untoward consequences have been the occasional tenderness of the skin referred to, and, where the air has been applied to the upper part of the thorax, an unpleasant sensation of pressure about the throat, causing pain in swallowing or in movement of the larynx. It is well, on this account, to avoid pushing air into loose tissues about the neck.

Enough has been said to indicate the type of case in which the above treatment is specially applicable. Pure sciatica is less amenable to the treatment than lumbago. There is undoubtedly a large proportion of sciatica cases who have arthritis of the hip-joint in some form ; whether the proportion is so great as has been recently declared I am not in a position to judge. The practitioner will often deem it advisable to combine the treatment with the administration of drugs, such as aspirin, iodides, purgatives, iron compounds, and so on. In sciatica the case may be inveterate or severe enough to call for direct nerve-stretching or the injection of normal saline into the substance of the nerve ; in milder or less chronic cases the treatment by atropine-injection long ago recommended by Sir T. R. Fraser may be combined with the subcutaneous air-injection, using the same needle for both purposes. The atropine-injection is made deeply into the nerve at its exit from the pelvis, and the patient will always make it clear if the target has been struck by the tingling sensation down the leg ; the needle is then partially withdrawn and the air-injection is carried out. The double manoeuvre is almost always effectual in giving temporary relief in the large number of cases where some pain about the back and buttock is combined with sciatica, and its repetition on several subsequent occasions sometimes cures where other measures have been unavailing.

There is another type of case often mistaken for true sciatica where aching is complained of in the region of the gluteus maximus, the back of the thigh, the popliteal region, and extending to the back of the calf.

Here the pain is confined to the distribution of the small sciatic nerve, a nerve whose cutaneous distribution is much more extensive than is usually realized. Hilton (" Rest and Pain "), in contending that the nerve that supplies a muscle with motor impulses has its sensory distribution in the skin overlying that muscle, points out how this is exemplified in the case of the gluteus maximus where the correlation is not at first obvious. The gluteus maximus is inserted into the deep fascia of the thigh, and the lower part of fascia may be regarded as the continuation of that muscle ; the small sciatic nerve which supplies the muscle has its cutaneous distribution in a large area extending from the buttock and back of the thigh over the popliteal region to the back of the calf.

In no type of case is the air treatment more effectual than where the fibrositis has spread from the back over the region supplied by the small sciatic nerve.

The explanation of relief from pain by the method described is not apparent. We know that prolonged and severe sciatica is sometimes relieved by stretching the nerve either directly or indirectly by raising the limb to a right angle with the supine body. It may be that the air-injection, in stretching the nerve-terminations which course in the cellular tissue, mechanically affects the nerves of the muscle and its sheath. That the nerves of muscle are competent to produce pain is proved by the pain of muscular cramp and other facts. In the skeleton muscles there are three sets of sensory end-organs—viz., muscle-spindles, Golgi's tendon-organs, and Pacini corpuscles. All these end-organs appear to be adapted for mechanical stimulation, and not for chemical or thermal stimuli. The pain of fibrositis, as typified by lumbago, would certainly appear to have its origin in the sensory end-organs of muscles and tendons, their perimysia, and their sheaths. Inflammatory hyperplasia of fibrous tissue would produce mechanical stimulation of the afferent end-organs in these tissues, especially on movement ; that is the peculiarity of the pain of fibrositis. For instance, differentiation of the pain of so-called muscular rheumatism of the abdominal muscles from a deeper pain depends on that peculiarity.

Again, in distinguishing fibrositis in the back from other lesions producing pain there, we are alive to the local tenderness of the contracted muscle in the former case.

The phenomena of associated sensations, such as the tickling of the nose which is felt on looking at a bright light, and the whole range of referred pains which were brought into prominence by Hilton and others, have directed attention to obscure lesions in the viscera. The facts of the segmented character of the spatial arrangement which had been systematized by Head are helpful in diagnosis ; but the pain of fibrositis has its own characteristic peculiarity, and the mechanical explanation of its relief by subcutaneous air-injection accords with the nature of the pain.

In this connection it may be pointed out that if the theory is correct that the pain in the back which characterizes smallpox, influenza, and other infections, is caused by toxic chemical stimuli, these stimuli cannot act directly upon end-organs which are only adapted for mechanical stimulation. It is possible that they act indirectly by their influence on the vasomotor centre in the brain.

A few selected cases will illustrate the application of the air-injection treatment. Cases are chosen where the action of aspirin or other drug did not confuse the result. Most of the cases were doubtless amenable to other forms of treatment, and we are all familiar with immediate and striking results in certain cases of fibrositis by the injection of drugs, counter-irritation, and so on. It remains to be judged whether the method of air-injections gives a larger proportion of cases of decided and lasting relief than other methods. It is certainly no panacea ; it may require to be repeated several times at intervals of a week or ten days, and only as an adjunct to the treatment of such conditions as constipation, gout, tobacco-poisoning, and arthritis ; but proof of the comparative value of the method is forthcoming when patients who have undergone a variety of forms of treatment return during subsequent attacks, months or years after, for a repetition of the air-injection treatment which they found so effectual.

A thick-set man of thirty, living fifteen miles away, sent for me on account of a sudden disabling pain in the back which seized him while washing. He had had attacks of lumbago previously. I found him lying on his side, apparently unable to move. He had felt discomfort in his back for a day or two before the sudden acute seizure. Treatment by air-injection was carried out, and in a few minutes the patient was able to stand up and pick up articles from the floor. Some weeks after he called to say that some pain continued for a few days, but not sufficient to prevent him from moving about freely.

A young man of thirty-three had suffered from left-sided pleurisy eighteen months previously ; the left side of the thorax often ached, and latterly the pain had been very troublesome, especially on vigorous movement. No friction detected. Tenderness along intercostal spaces in axillary and infra-axillary regions and about the pectoral muscles. Air was injected and distributed about part affected, with relief of pain. There was soreness of the skin for four hours afterwards, which kept him awake, after which all pain disappeared. A fortnight later patient reported occasional return of the pain, to a less degree than formerly. A week later a second injection was made. A few months later patient reported that he very occasionally felt some slight return of the pain when tired, but not enough to give trouble.

A man of forty-three, who is subject to fibrositis, sent for me urgently as he was unable to dress on account of a sudden pain near the angle of the scapula. Patient held himself in a constrained attitude and could not bear to be moved. There was tenderness along the latissimus dorsi. Air-injection gave immediate relief, so that patient was able to dress and move easily. Next day soreness was still present, but patient was able to be busy in his garden.

A woman of thirty-seven complained of rheumatic pain about the neck and shoulder, which had lasted for ten days. She was subject to lumbago and other manifestations of fibrositis. On a previous occasion a pain in the back, which had crippled her for three weeks and was not benefited by large doses of aspirin, had yielded to air-injection, and shown no sign of recurrence. The trapezius and deltoid were tender. Air-injection was carried out, and gave great relief. In the evening I was rung up, as patient was alarmed by a tight unpleasant sensation about the throat, which was swollen, and she was afraid to swallow on account of pain. Hot fomentations relieved the symptoms, but pain in the throat did not disappear for two days. There was no recurrence of the " muscular rheumatism."

Mrs. F., aged forty-five, had been suffering from pain in the occipital region and back of the neck for a fortnight. She was unable to hold up her head. Great relief was afforded by air-injection, but there was considerable soreness and discomfort about the neck and throat for several hours during the night.

A young man of thirty-two had been suffering for a few days from a pain in the outside of the leg, from the knee to the ankle. The pain was getting worse and made him lame. Air-injection gave relief at once, and the pain did not return. This patient is subject to attacks of sciatica, which have occasionally continued for several weeks or months, sometimes with intervals of many months of complete freedom from pain. He has visited Rotorua and undergone various modes of treatment, such as high-frequency currents and electrical baths. For the last few years, when attacked by his old enemy, he always returns for the air-injection and atropine treatment. The attack sometimes requires several applications, but is more effectually relieved by this treatment than any other. Aspirin and iodides appear to be valueless in this case.

A man of forty-seven (case reported by a colleague) was suffering from intense supraorbital neuralgia. For years he had periodical attacks. Injection of air into the region affected gave immediate relief, the patient saying, " The pain is quite gone." He drove home in a cold wind, and had no return of the pain.

A girl of eighteen, a dressmaker, had suffered from a pain in the back for eighteen months ; it occasionally got better for a few days ; it became worse after prolonged sitting and when tired. She was also subject to headaches. Tenderness was present over erector spinae in loin and back on both sides and across sacrum. No cause of referred pain was discovered in viscera. There was hypermetropia and some anaemia. Air was injected on the 17th November and whole back vigorously massaged, a large quantity of air being used. There was a considerable amount of soreness of the skin that night, especially about the neck. On the 10th December she returned to report that the backache had recurred to a slighter extent during the last week. A second injection was made accordingly. On the 27th January she reported that the backache had not returned. In this case compound Blaud pills were also administered, and plus lenses removed the headaches.

TEN CASES OF SPLENECTOMY FOR SPLENIC ANAEMIA.

WITH NOTES ON THE OPERATION AND ITS INDICATIONS.

By R. A. Stirling, M.D.,
Surgeon to the Melbourne Hospital.

These notes may be looked upon as a surgical sequel to Dr. Springthorpe's account, at a previous Congress, of a number of cases of splenic anaemia occurring in the members of two distinct families.

I have so far operated on ten cases, the last one—a few months ago—recovering very rapidly, although the spleen was exceedingly large and adherent. The ninth case died of haemorrhage about twelve hours after operation with almost appalling suddenness, although I had taken special pains by doubly ligating each vessel to prevent such a disaster. The only other unsuccessful case was one of Banti's disease, complicated by ascites—itself a positive contra-indication to operation, and operated on only as a *dernier ressort*—a procedure I am not likely to repeat, on account of the difficulty of restraining the haemorrhage, and the lessening of the normal coagulability of the blood. Clamping of the pedicle, for ligatures cut through it with the same ease as a pair of scissors, was effective for fifteen days, but on removal of the clamp bleeding quickly recurred, with a fatal result.

A younger generation has furnished me with the eleventh case in a boy of eight, but I have not yet operated on him.

Although the operation is in these cases almost invariably a severe one, with many pitfalls, and although the resisting-power to infection is said to be materially reduced for a few days after splenectomy, in none of the patients were there any signs of post-operative sepsis. It is remarkable to observe how rapidly the anaemia, the sallow complexion, the listlessness, and the cachexia generally clear up after the removal of the viscus, which from a very early age has been undermining the health of many members of the same family.

Although we are quite in the dark as to the real function of the spleen, there is nothing in their subsequent history that would suggest that they were spleenless, although, as some experiments show, such people regularly excrete an abnormal quantity of iron.

The Surgical Anatomy of the Spleen.

In man the spleen shows only a faint trace of the three-lobed organ of varying size and form that is found throughout the mammalian series ; while the posterior lobe, so large in the kangaroo and other marsupials, is reduced to a mere projection.

The spleen swings from the diaphragm by its suspensory or phreno-splenic ligament, which forms part of the wall of the lesser omentum ; it is attached to the stomach by the gastro-splenic omentum, which extends forward to the greater curvature of the stomach, and below unites with the gastro-colic ligament.

The gastro-splenic omentum is a much wider structure than formerly depicted in anatomical plates, with a tendency to curve round the upper pole of the organ, and containing at least three large blood-vessels—the vasa brevia of the splenic artery which pass from the spleen to the stomach. This may be looked upon as the superficial layer of the pedicle, for beneath it and the lieno-renal ligament, which proceeds backwards to the anterior surface of the left kidney, there lies from below upwards—the tail of the pancreas—not in reality a tail, certainly not a tip, but a dead square-shaped end, and the branches of the splenic artery and vein. These number about four, and the lowest is in close juxtaposition to the pancreatic tail.

If, as is commonly the case, the pedicle is ligated *en masse* with both its blades enclosed, the pancreatic tail must form a portion thereof, with the result that the ligature is very liable to slip. Moynihan states that in some cases the tail of the pancreas has accidentally or deliberately been included in the ligature surrounding the pedicle, in order to ensure a firmer hold. Esmarch advises that this should be done if there is any doubt as to the security of the ligature. I lost my ninth case through following this plan, owing to the ligature slipping. To prevent such an accident, I now free the spleen from below, dividing the lieno-renal ligament ; ligating also the vessels of the gastro-splenic omentum separately and as far as possible from the stomach ; avoiding also the supra-renal capsule which always lies exceedingly close to the enlarged spleen. Then I divide the suspensory ligament—the costo-colic and the adhesions to the diaphragm between ligatures or clamps. It is here also that haemorrhage now or subsequently — and it may be uncontrollable haemorrhage—may occur owing to defective ligation of a branch from the aorta or coeliac axis, arising about the level of the cardia and running to the left. The spleen can now be rotated out of its bed, and delivered when the splenic vessels are easily secured from behind, the lesser sac of the peritoneum being opened during the ligation.

The splenic vein is very apt to tear, hence carrying a ligature *en masse* is dangerous. When possible, each big vessel should be doubly ligated separately with silk, in the face of the stump.

The splenic veins lie below the artery.

G. A. Wright in 1888 : " Splenectomy is very dangerous, the chief danger being from haemorrhage and shock, and there being especial danger of bleeding from a vessel that passes between the spleen and the diaphragm. Whether it is altogether an abnormal vessel or merely a dilatation of a small vessel existing there I do not know, but it is responsible for the death of my patient and of three others, including a leucaemic patient."

The Operation of Splenectomy.

The surgeon should stand on the left side, as he thus obtains a better view of the pedicle, the ligation of which is the most important step in this operation.

Step 1.—The incision should be made on the outer border of the left rectus, beginning at the costal cartilage and continuing down to or below the umbilicus.

A sterile towel soaked in saline solution is now introduced, and pushes the intestines into the right half of the abdomen out of harm's way.

Auvray (*Presse Medicale*, 1905) has recommended that the incision be prolonged outwards and backwards over the lower part of the thorax at the level of the 8th space. In this way a flap of the soft tissue is cut, which, when dissected up and turned downwards, freely exposes the cartilaginous thoracic border—in other words, the 10th, 9th, and 8th cartilages. These cartilages are then divided with knife or scissors close to their anterior extremities, and freed from before backwards and from below upwards, the knife being kept very close to the deep surface during the separation of the underlying soft tissues. Finally the thoracic segment is excised by cutting the cartilages a little in front of the costo-chondral junction. Then, by gently retracting the soft tissues with the fingers, and raising the remains of the thoracic border with a broad retractor, the whole spleen will be exposed, and it will be possible to examine its anterior border, the external surface, and the two portions separated by the attachment of the gastro-splenic omentum, of the internal surface, and it will be easily possible to draw down the upper pole.

Step 2.—Separation of adhesions.

These render the operation difficult, and it may be impossible. In my first case, at the close of a long and tedious dissection, I found the large spleen very adherent to the splenic flexure of the colon. Dr. Embley told me that the patient had come to the limit of her endurance. In the final manipulation, however, I unfortunately tore widely the splenic flexure of the colon. This was rapidly sutured. She made a good recovery.

Deal particularly carefully with the phrenosplenic ligament, ligating, if possible, each section with double ligatures before dividing between them. To reach this ligament Jonnesco advises that the operator should pull the spleen covered with a gauze pad gently to the right, an assistant with his gloved hand raising the ribs and drawing the left edge of the wound to the left, thus exposing the diaphragmatic vault. It is inadvisable to trust to ligature of this ligament after removal of the spleen—it is easier and safer to tie with the organ *in situ*. The spleen should never be seized with instruments, as the haemorrhage from its torn tissue may be uncontrollable.

Step 3.—Ligation of the pedicle. (See " Surgical Anatomy.")

At times, in very large spleens there is hardly any pedicle. In cases complicated with ascites the operation is contra-indicated as the tissues of the pedicle become sodden and softened. In one case the ligatures cut through, and it was necessary to use and leave clamps covered with rubber at their ends. I have twice successfully used tamponage to stop haemorrhage.

Step 4.—Revision of the area from which the spleen has been removed and final haemostasis. Bleeding from the diaphragmatic pillar may require a few sutures for its control.

Step 5.—Closure of abdomen in usual way.

The following precautions of Jacobson should be followed : (1.) To prevent any tension being exerted on the pedicle. (2.) To secure every vessel. (3.) To divide these in a relaxed condition at a sufficient distance from the ligatures. (4.) Not to include the tail of the pancreas. (5.) After all the ligatures have been applied it may be well for sake of safety to throw one around the whole.

Indications.—The spleen may be removed for the following conditions :—

1. Splenic enlargements other than tumours can be grouped in three general classes (W. J. Mayo),—

(*a.*) Leukaemias, in which the spleen-pulp becomes converted into tissue resembling bone-marrow, and in which the spleen, in common with all the blood-forming organs, rapidly produces white blood-corpuscles of the ancestral type, much as epithelial cells run riot in cancer—a probable reversion to the foetal form of blood.

(*b.*) Splenic anaemia, the type in which the enlargement of the spleen is accompanied by a diminution of and change in character of the red blood-corpuscles.

(*c.*) Splenomegaly—an enlargement without marked blood-changes, or any apparent serious interference with the health other than mechanical.

2. Injury.
3. Hydatid.
4. Wandering spleen on account of the danger of torsion of pedicle.
5. Malarial spleen under certain conditions.
6. Gunshot wound of spleen.

In a case of hydatid of the spleen of enormous size on which I operated, and sent to me by Dr. M. U. O'Sullivan, some years ago, the patient, a robust and vigorous young man, would only consent to operation when pyrexia, pain, and other signs of commencing suppuration forced it upon him. To remove the daughter cysts it was necessary to make a section through a considerable thickness of the spleen, which presented in the depths of the wound. The bleeding was the most terrific I have ever encountered, and could only be stopped by tamponage and subsequently ligature *en masse* of the cut edges of the splenic tissue. The latter is much more friable than hepatic tissue and also more vascular, but fortunately in this case the splenic capsule was thickened, and formed a *point d'appuis* for the sutures.

I look upon ascites as a distinct contra-indication to operation—also grave lesions of the liver, as shown by urinobiluria and jaundice, with their consequent liability to haemorrhage, haematemesis and meloena. Marked painful paroxysms denoting perisplenitis and subsequent adhesions are disquieting symptoms, and, of course, the larger the spleen the more difficult frequently its removal. Of all the adhesions, those with the diaphragm are the most dangerous, and in one reported case in removing them the stomach-wall was injured and perforated later with fatal peritonitis.

Spleniculi were found in only one of the eleven patients, and were not removed. For some reason this patient eighteen months subsequently was not doing well, and Dr. Springthorpe asked me to reopen her abdomen and remove the subsidiary spleens of which two were noticed at the first operation. There was no trace of them, however, and it is probable that the removal of their blood-supply by the ligation of the splenic artery caused their disappearance.

Splenectomy seems to have recently been successful in that medical reproach, pernicious anaemia. Klemperer and Hirschfield report two cases in which they removed the spleen, with marked improvement. Eppinger has also operated in the same way in two cases. He removed the spleen on the ground that in haemolytic anaemia there seems to be a pathological excessive destruction of the reds in the spleen. The hope that the splenectomy would stimulate the new production of red blood-corpuscles was fully realized, although numerous megalocytes remain.

The spleen was not enlarged in any of the six cases of pernicious anaemia reported to date. In Eppinger's cases, after six months the men were gaining in weight and feeling perfectly well. (*Therapic de Gegenwart*, Berlin.)

If there be marked cachexia with haemoglobin below 40 per cent. the operation is contra-indicated. Kopylow, who has removed thirteen malarial spleens, has found records of 187 others, with a total mortality of 25 per cent.

Blood-changes after Splenectomy.

With regard to the red cells it was noted that there was a surprising variability from day to day, the fluctuation apparently having no connection with the degree of leucocytosis or the temperature. The results of the final examinations show a lessened number of red corpuscles. Microscopically the red cells showed at no time any evidence of even a moderate anaemia, which is a characteristic result of splenectomy in dogs. An occasional poikilocyte was seen, but no nucleated forms were seen at any time.

The haemoglobin estimations made showed a variability in readings slightly above or slightly below the normal, with an occasional high reading. Roughly, we can say that there was little deviation from normal.

With regard to the leucocytes, it will be noted that at first there was a tremendous increase, so that on the morning after the operation in one case the number was 110,000. This seems enormously high, but Muhsam has reported a "leucocytosis of 80,000 after splenectomy for ruptured spleen."

In one case four days later the count had fallen to 12,000, which was the lowest estimate made at any time. The sudden rise to 27,000 the following day was coincident with the onset of pneumonia. From this on the counts remained persistently high, partly on account of the pneumonia and partly as a result of splenectomy, as evidenced by the fact that on the day of discharge from the hospital, apparently quite well, the patient had a leucocyte count of 20,400.

It was in the results of the differential leucocyte counts, however, that the most interesting features were seen. All the previous cases showed a lymphocytosis some time after splenectomy ; here we were able to note the development of the lymphocytosis in the face of inflammation, which should normally call forth a polynuclear neutrophilic hyperleucocytosis.

At first practically all the leucocytes were polymorphonuclear neutrophiles, but as the case develops the lymphocytes (adding the large and small varieties together) are steadily gaining, so that on the 2nd July, 1907, in the presence of active inflammatory processes, we find the following count :—

Total leucocytes—34,000.

Polymorphoneuclear neutrophiles	75·6
Small lymphocytes	15·6
Large lymphocytes	4·8
Large morphonuclears	1·6
Eosinophiles	2·4

It is not possible in a paper such as this to furnish tables of all the differential counts made. The one above is sufficient to show the trend of the developing lymphocytosis, although the figures here given are practically normal. When it is considered, however, that the first counts made showed practically all polymorphonuclear neutrophiles, these results, in the light of the fact that a lymphocytosis developed in previous cases, are practically suggestive. One of the previous cases showing lymphocytosis was found to have "accessory spleens"; they were not found in this case, though looked for.

In these early results, after removal of the spleen, we found no trace whatever of the eosinophilia which occurs frequently after splenectomy. The eosinophile cells remained persistently low, and beyond the fact that an occasional myclocyte and mast cell were seen, no other cells calling for comment were noted.

Summarizing the early results after splenectomy, we may say that the two most interesting features are, firstly, the variability in number of the red cells, with haemoglobin-content practically normal and the microscopic appearance showing no signs of anaemia. This would seem to show a lack of balance between production and destruction of red cells consequent upon removal of the spleen, the haemoglobin remaining high to give the necessary supply of oxygen for the carrying-on of metabolism. The results seen of cases later after splenectomy seem to show that this balance is recovered.

The second feature is the developing lymphocytosis, which also seems from the previous cases to be eventually controlled. However, the eighth case has shown it developing in the face of inflammation, which should call forth a polymorphonuclear neutrophilic leucocytosis. This would seem to show that removal of the spleen gives a stimulus to the lymphatic apparatus of the body, and causes thereby a hyperlymphocytosis.

It is interesting to note that in two cases of the series the lymphatic glands throughout the body enlarged on the fourth or fifth day, and remained so during stay in hospital. This last case showed no such enlargement, neither was the symptom emphasized by Mayo noted—viz., pain in the ends of the long bones.

SURGERY OF GASTRIC AND DUODENAL ULCER.

Opener—Thomas Fiaschi, D.S.O., M.D., Ch.D. (Pisa and Florence),
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Gentlemen,—The President of this section did me the honour to appoint me as one of the openers of this discussion, and, though feeling very incompetent for such an important task, I will briefly focus to you my views on the present position of surgery regarding gastric and duodenal ulcer.

Importance of an Accurate Diagnosis.

All surgeons who have had some experience in this field have recognized the following two facts: First, the wonderful relief from pain and great improvement of the general health that occurs in a great number of chronic sufferers from gastric or duodenal ulcer who had a gastrojejunostomy performed on them; second, the absolute failure to obtain any post-operative benefit in a certain number of cases who had been diagnosed as gastric or duodenal ulcer, and who had undergone a gastrojejunostomy by the identical method as the others. The only way to account for this difference of results is that the two classes of cases are not identical; and on more careful analysis of them we find that the first class is composed of the so-called chronic ulcer of the duodenum or of the stomach, generally accompanied by some interference with the pylorus, either in the way of citatricial stenosis, or pylorospasm, or pyloric ptosis from adhesions to the neighbouring organs. The second class is composed of a very large number of cases in which, whilst some of the gastric-ulcer symptoms were present, the ulcer really did not exist. Such pseudo-gastric ulcers may include the class of cases that Moynihan described by his happy hibernianism, "the gastric ulcer is in the right iliac fossa" (*British Medical Journal*, 26th July, 1913, p. 171). The symptoms of it are a reflex from some obstructive or inflammatory condition of the appendix. According to the maxim that W. Mayo is so fond of reiterating to his audiences, "The stomach speaks for the whole abdomen"; there are many other abdominal organs that may be the cause of gastric-ulcer symptoms. Chief amongst these, the gall-bladder with its cholecystitis and calculous conditions, and subsequent possible chronic pancreatitis; also the large intestine, which, apart from chronic appendicitis, may in certain forms of chronic colitis give rise to symptoms simulating those of gastric ulcer. To these more or less imflammatory conditions we must add certain mechanical displacements such as gastro and colo-ptosis, so well described by Professor Rovsing, of Copenhagen, in which cases a gastro or colopexy would give better prospects of permanent relief than a gastro-jejunostomy (*Annals of Surgery*). Lastly, we must not forget a small minority of cases, in which the whole syndrome is purely neurotic; that is the true hypochondriac. I am rather reluctant to mention these, as, unfortunately, in the past hypochondriasis has been a convenient term to hide our powerlessness in diagnosis. The strictest care in differential diagnosis shows that such a mental condition is occasionally found, and exploratory abdominal incision in the hands of the most careful surgical diagnosticians has proved it. In treating these cases, to continue Moynihan's dictum, " the gastric ulcer is in the brain," and surgical treatment should be discouraged.

These facts show that the surgery of gastric and duodenal ulcer to be successful must be based on a very accurate pre-operative study of the case and diagnosis. All available means of diagnosis, such as test meals, careful mapping of the stomach by air-insufflation, and radiography should be resorted to. We know as a certainty that the X-rays will not show an acute gastric ulcer, but with a suitable bismuth mucilage meal they often show a chronic callous ulcer, and will clearly show ptosis of any part of the digestive canal.

We shall thus eliminate many of those cases that would do better if operated for something different, or which should be handed over to the care of the physician Amongst the latter I will add acute gastric ulcer of the young, particularly of young women, which by the Von Loebe or Lenhart's or Katzenstein's diet and suitable rest treatment may be cured without an operation. With these safeguards we shall remain with a class of cases, great sufferers, in whom medicine has exhausted all its resources, and in whom a well-planned operation will give relief and cure.

No Loop Posterior Gastro-jejunostomy.

Having now to deal with a properly diagnosed and real chronic ulcer of the stomach or duodenum—which, by the by, are almost equally frequent—what is the best operation to adopt? I think that the majority of surgeons are at this time agreed that the posterior no-loop gastro-jejunostomy offers the best results. Some surgeons, like Moynihan, implant the jejunum to the stomach in a manner that it runs to the right; others, like the Mayos, make it run to the left. I have for several years followed the latters' practice, and their other operative detail of attaching the edges of the torn mesocolon to the edges of both stomach and jejunum, and had never cause to regret it.

Destruction of the Ulcer-bearing Area.

One of the points *adhuc sub judice* now arises. Should we in cases of gastric ulcer merely be satisfied with the performance of the gastro-jejunostomy or should we exercise or in any other way destroy the ulcer-bearing area? This certainly is a prolongation of the operation and an additional immediate risk, but if we consider the pathological relationship between gastric ulcer and gastric carcinoma, I think that wherever possible it greatly adds to the remote prospects of complete recovery for the patient if this is done. Wilson and McCarty, the pathologists of the Mayos at Rochester, in an excellent report of 218 cases of gastric carcinoma, conclude, roughly speaking, that two-thirds of a very long series of carcinomata undoubtedly took their origin in true existing ulcers (*American Journal of Medical Sciences*, December, 1909).

My practice has been, wherever I could feel distinctly the ulcer, if this was very thick and callous and either on the lesser or greater curvature, to excise it, and then unite in a suitable way the gap left in the stomach, if not too thick to ligature it as the Mayos do by passing through it crossways two needles armed with black thread, and thus strangling it, covering after the ligatured part by stitching over it the serous coat. This I have done in several cases with good result. If a thick chronic ulcer is found in the pylorus I invariably do pylorectomy in such a manner as to include the whole of the affected area, followed by the usual short-looped posterior gastro-jejunostomy. That such a course is not excessive was proved by a case I did two years and a half ago. A gentleman who had for three years before been treated for neurasthenia was found by me to have a thick callous ulcer near the pylorus, and I removed the pyloric cone of stomach bearing it. The pathological report by Professor Welsh showed carcinoma just beginning. Had I, in that case, limited my interference to a simple gastro-jejunostomy, and not incurred the slight additional operative risk, the patient would not be now as he is, alive and well.

Exclusion of the Pylorus in Duodenal Ulcer.

When a callous ulcer is found in the duodenum, which is a little more than in half of the cases, what are we to do? Shall we simply perform a gastro-jejunostomy, or shall we excise the affected portion of the duodenum, or shall we in some way close effectually and permanently the pylorus?

Duodenal ulcer is generally considered to be a lesion of the intestinal mucosa due to hyper-acidity of the gastric juice. This explains the frequent seat on the anterior aspect of the duodenum. Duodenal ulcer really is a peptic ulcer. Of late certain objections have been raised against this theory. Katzenstein, after a series of experiments, has convinced himself that the wall of the stomach, of the duodenum, and to a lesser degree of the upper part of the jejunum, possesses a special power of resisting peptic digestion, and this is due to a special ferment, to which they have given the name of "antipepsin." The presence of an ulcer would be due to an absence in a certain area of this anti-pepsin (*British Medical Journal*, 27th December, 1913, p. 1636). Granting the truth of this theory, there still remains the fact that the passage of the gastric contents over the duodenal area irritates and aggravates any ulcer present. Gastro-jejunostomy was originally planned by Nicoladoni and Wolfler for the purpose of deviating the acid chymus from the pylorus and passing it through the new stoma directly into the jejunum, but does this really happen? Experimentally in dogs under ether anaesthesia it has been shown both by Cameron and Murphy and by Legget and Murray that in more than half of the cases of gastro-enterostomy, in which the pylorus has been left intact, no food whatever passes on into the small intestine through the stoma. By the use of the X-rays, bismuthized food was shown by Cannon to follow the normal peristaltic wave of the pyloric portion of the stomach, and to pass through the pylorus into the duodenum (*Medical Record,* 1909, vol. xxvi, p. 589, as quoted by Prog. Medicine). Now, then, half of the cases of duodenal ulcer operated by simple jejunostomy would be exposed to the risk of having no short-circuit effect at all; and even allowing the inflow of some of the alkaline fluids from the duodenum through the stoma into the stomach, thus neutralizing the hyperacid gastric contents, the fact remains that many of the cases so operated do not yield the results expected. To remedy this, Von Eiselberg, of Vienna, since 1893, advocated that gastro-enterostomy should be accompanied by pylorectomy, with separate suturing of the gastric and duodenal stumps. Of course, the addition of this important step to the operation increases the gravity of it, and to diminish this operative risk it was proposed to exclude or block the pylorus by tying round it some sort of loop, either silk thread or silver wire. Unfortunately for this simple procedure, constriction by such means is only temporary. Burci's experimental researches (*Lo Sperimentale,* year 4xvi, Tasc vi, p. 678) on dogs have proved long ago that whenever such a ligature is applied to the pylorus it gradually cuts through the various layers of the walls, and whilst these join again above and behind the ligature, this ends after a certain period of time by dropping in the intestinal lumen, and thus the complete patency of the intestine is again established. To avoid this, various plans have been proposed, such as Kelling's and Mayo's "blocking of the pylorus by infolding," and Gerard's transverse division of the sero-muscular coats, without touching the mucosa and then uniting the first two longitudinally, thus reducing the pylorus to a cord-like narrow tube impenetrable to the alimentary mass, but yet open to the thin fluids and secretions. The objection to this method is that in course of time the strong propulsion of the gastric contents by the powerful gastric musculature may after a while dilate this narrow tube, and thus restore patency of the pylorus; also, that the hyperacid fluid still finds its way into the duodenum. Clinical cases are not wanting to prove the insufficiency of this method. Propping, of Rehn's clinic, in Frankfurt a/Main, presented a man aged twenty-eight years, who was found to have duodenal ulcer. Posterior gastro-enterostomy was established, and the pylorus was excluded by tying a stout silk thread around the stomach. Soon after this the patient again had severe pain. Within three months a second laparotomy was performed. The pylorus was found open, there were a number of ulcerations round it, and the thread had cut half-way through.

A better suggestion has been that of Wilms, of Heidelberg. Basing himself on the enormous vitality of strips of aponeurosis grafted on to other tissues, as proved by experimental researches on dogs, he advised the blocking of the pylorus by tying round it a strip of aponeurosis detached from the sheath of the rectus abdominis muscle. This simple and safe method, however, according to Casagli's experiments on dogs, does not completely occlude the pylorus; though the more solid gastric contents cannot pass, the fluids can. Casagli improved Wilms's method by first crushing the pylorus between forceps, then applying the strip of aponeurosis, removed from the rectus muscle, lightly round and fixing it by one or two points of suture and then drawing over it all round, and suturing over, the serosa. I tried this Casagli improvement of Wilms's method last year in one case of duodenal ulcer, and it succeeded admirably, but I found that it took so much time that I could have easily in the same time have performed a pylorectomy. For this reason, in all cases of duodenal ulcer that I have operated subsequently, I have accompanied the gastro-jejunostomy with a pylorectomy, and had good results both immediate and remote. The excision of the first portion of the duodenum, and even a simple excision of the duodenal ulcer, is a most difficult and dangerous operation, which, except under exceptional circumstances, I do not consider justifiable.

Perforation.

Coming now to the complications of gastric and duodenal ulcer, the most amenable to treatment is acute perforation. The best and most modern treatment for this severe condition can be summarized in the following words: Immediate and rapid operation, closure of the ulcer with two or three stitches, plication of the wall of the duodenum or stomach close to it, no irrigation, fortification of this area by covering over with the gastro-colic and gastro-hepatic omentum, multiple drainage, one tube to the side of the perforation, one second and a third in the right and left lumbar regions, and a fourth in the supra-pubic region if fluid exists in the pelvis; elevation of the patient's body, early feeding by the mouth and continuous saline irrigation by the rectum immediately after the operation (Cawardine, *Lancet*, 1910, vol. 1, p. 239).

An important question can be raised: Should the closure of the perforation be accompanied by the performance of a gastro-jejunostomy? This plan has recently been strongly advocated by John B. Deaver ("Transactions of Section of Surgery: The American Medical Association"). Whilst quite possible that good results may follow in the hands of very experienced and quick surgeons like Deaver, it does not appear prudent to expose a patient in such an acute condition to an unnecessarily long operation. When we met in Melbourne I reported to you a case in which I had done this and the patient died. Since then I had a good many cases of perforation with proportionate good results, and in all of these I was satisfied with simply closing the perforation. Some of the patients presented no further symptoms; those who did, I operated by a gastro-jejunostomy a few weeks later, and in doing this subsequent operation I was much struck by the fact that the site of the plication and stitching of the duodenum or stomach had assumed an absolute normal appearance, a fact that has been observed by others.

In cases of perforation coming for operation when the general conditions are too bad to allow even the rapid interference already mentioned, it is well to try Morris's method. This consists in drawing rapidly the open ulcer to the margins of the incision and fastening it, thus establishing a gastrostomy. This at a later time can be closed. Morris records two successful cases in practically moribund patients.

Haemorrhage.

I will end by mentioning haemorrhage, the result of a gastric ulcer. In this very grave and difficult condition, the only recent addition to our means for securing the bleeding-point is Rovsing's gastro-diaphanoscope, a tube carrying at the top an electric light slightly larger than a cystoscope. The stomach is exposed, a small opening in the anterior wall is made through which the diaphanoscope is introduced, air is pumped in to distend the stomach, and thus the bleeding-point can be searched for and located. I was present at the Montreal meeting of the American surgeons in 1912, and heard Professor Rovsing speak in very glowing terms of the help that his method could afford to the surgeon in this difficult problem. As I, however, have never had occasion to use it, I refrain from giving you my opinion concerning the real usefulness of it, but I certainly think it well worth worth trying.

Mr. G. A. SYME said,—I speak on this subject with diffidence and humility. I might almost say humiliation. With diffidence because my experience is so limited, with humiliation because while limited it has been of such a character as to make me doubt the entirely satisfactory character of much of the surgical treatment of gastric and duodenal ulcer, and make it difficult to express decided opinions. Surgeons seem to be fairly unanimous about the treatment of one class of ulcer—that associated with food-retention in the stomach. It is here that gastro-enterostomy has given such brilliant results, and, like every other surgeon, I have had numerous successful cases. But is gastro-enterostomy alone sufficient? It relieves the obstruction, but does it give a permanent cure of the ulcer? On the 15th April last I saw, in consultation with Dr. Ward, a patient, J. H., aged fifty-two. He had severe attacks of pain in the epigastrium and left hypochondrium; vomiting of digested food, bile, and sometimes blood; and loss of weight. Eight years previously I had performed gastro-jejunostomy on him for ulcer at the pylorus with obstruction, and for three years he was regarded as a most brilliant success. Five years ago he had a severe haematemesis, and has never been well since. I have seen two other somewhat similar cases, and quoted one in my presidential address at the Sydney Congress. In a paper published in *Annals of Surgery*, June, 1908, W. Mayo said, " Calloused ulcer of the pyloric end of the stomach indicates the operation of Rodman," and with this opinion I agree. But in later communications—*e.g.*, *Annals of Surgery*, September, 1911—Mayo said, " Practically all ulcers near the pylorus accompanied by obstruction were relieved by gastro-jejunostomy, whether the ulcer was excised or not." Another reason for performing pylorectomy or Rodman's operation in such cases is not only that carcinoma may subsequently develop, but the difficulty of deciding that it is not already present. Here are two specimens of ulcer in which I performed pylorectomy, which microscopically and externally are much alike: one, which at the time I did not regard as malignant, either clinically or at operation, because it had perforated, proved on microscopic examination to be carcinomatous; the other, which I thought clinically and at the operation to be malignant, was microscopically a simple ulcer.

What about ulcer of the stomach without food-retention? In the early days of gastric surgery, under the influence of its pioneer, Mayo Robson, these were also treated by gastro-enterostomy. But for some years it has been recognized that the treatment was not entirely satisfactory, and excision of the ulcer alone or with gastro-enterostomy has been carried out by many. You, Mr. President, have pointed out the fallacy of tabulated statistics, and I cordially agree with what you said.

But chiefly for my own information I got Dr. Tait, Surgical Registrar at the Melbourne Hospital, to collect all the cases of gastric and duodenal ulcer treated at that institution from 1909 to 1912, and to write to the patients to ascertain their present condition, and I am much indebted to him for the trouble he took. The number of cases is extremely small, because both the physicians and surgeons at the hospital are very conservative on this subject. Still, it may be of interest to give the results for what they are worth. In twelve cases diagnosed as gastric ulcer without food-retention gastro-enterostomy alone was performed; no patients died; three have been readmitted with a recurrence of symptoms. Of these, three are improved somewhat under medical treatment, one was operated on a second time and some adhesions treated; a third was explored again, and the gastro-enterostomy undone. This patient died, and post mortem no ulcer could be found, though the patient had typical symptoms—pain after food, vomiting, haematemesis, and meloena. Seven patients replied to letters; five of these still have symptoms, especially pain; three pain and vomiting; two pain, vomiting, and haematemesis. Only one patient said she was quite well: in this case the ulcer was at the pylorus.

In seven cases the ulcer was excised; two died from the operation, which was in each of the fatal cases a very extensive resection, with gastro-jejunostomy; two patients did not reply; two are quite well; one has had two attacks of pain, but is better now.

Mayo Robson gave as a reason for preferring gastro-enterostomy to excision that ulcers were often multiple, and excising one left others. W. Mayo (*Annals of Surgery*, September, 1911) denies this, and says more than 95 per cent. of chronic ulcers are single. I think it right to put on record some cases of chronic multiple ulcer. Fanny F. was operated on on the 18th May, 1910, and a thickened chronic ulcer excised from the anterior wall of the stomach, 3 in. from the pylorus, near the great curvature. On the 7th September, 1910, she required another operation for a perforated ulcer, which was found near the cardiac end, on the posterior wall near the lesser curvature, and was also indurated and chronic. Julia M. was admitted to Melbourne Hospital on the 6th June, 1910, with gastric ulcer, and died suddenly from pulmonary embolism; post-mortem, numerous ulcers were found—one large calloused ulcer at the pylorus, some healed ulcers in the fundus, some recent almost acute ulcers. R. J., admitted to Melbourne Hospital on the 22nd May, 1909, with perforated gastric ulcer, died, and post mortem had a chronic ulcer of the stomach and an old chronic ulcer just on the duodenal side of the stenoid pylorus, and which had healed. These cases are of interest as showing that ulcers of a serious kind, and not the so-called acute, medical, or toxic ulcers, may exist without external indication of their presence, and that ulcers may be multiple and in different stages—some healed by nature's processes and others recent and active. So that, as Mayo Robson claimed, excising one ulcer is no guarantee either that others may not be present or may not form later on. What we want is a treatment for the underlying condition that causes ulcer, not merely the surgical removal of its effect. That underlying condition is probably some infection—it may be from an appendix, a gall-bladder, a pyorrhoea, or the intestine—and we must ever remember not only the possibility but the probability of multiple lesions of various organs as well as of multiple ulcers.

With regard to simple duodenal ulcer without obstruction, the results at the Melbourne Hospital from gastro-jejunostomy with unfolding of the ulcers when definitely present have been satisfactory, and attempts at occlusion of the pylorus have not been made. Difficulty arises, however, when patients present typical symptoms of duodenal or gastric ulcer and at operation no ulcer can be demonstrated. Not infrequently in such cases the appendix is found to be affected, and is removed. But the symptoms, and especially haemorrhage, may still continue. While it is not wise to perform gastro-jejunostomy in such cases without further evidence of ulcer, would it not be well to open and carefully explore the stomach and duodenum? Permit me to quote a case in point. C. B., aged thirty-seven, admitted with epigastric pain two to three hours after food; three weeks ago vomited blood and had fatty stools; first attack of pain six months previously, lasting for three weeks, then free from symptoms for three months. Examination of last meal showed hyperchlorhydria. At operation on the 28th August, 1912, no evidence of ulcer of duodenum or stomach detected externally. The stomach was incised and systematically inspected, some tiny erosions and bleeding-points were found and ligated *en masse,* and a posterior gastro-jejunostomy performed. The appendix was found thickened and adherent, and removed. The patient has remained well.

In cases of perforated duodenal and gastric ulcers it is often assumed that if the patients recover from the operation they have no further trouble from the ulcer. During the years 1909-12, at the Melbourne Hospital eighteen cases of perforated duodenal ulcer were operated on, with twelve recoveries—nine have been traced and seven still have symptoms, chiefly pain, and in six of these seven a gastro-jejunostomy was performed in addition to infolding the ulcer. It was also done in four of the six fatal cases.

Twenty cases of perforated gastric ulcer were operated on, and sixteen recovered; eleven have been traced, and only two still have symptoms; of the nine satisfactory cases four had gastro-jejunostomy, five had not.

Personally, I have no definite rules in dealing with perforated cases. If seen early and there is not much extravasation of contents, I perform gastro-jejunostomy if the ulcer is near the pylorus and its infolding is likely to cause obstruction, and do not drain. If seen later, with much extravasation into the pelvis and flanks, with probability of toxaemia, I drain off such as quickly as possible, do not do gastro-jejunostomy, and drain supra-pubically, as well as above the umbilicus, and often in the flanks. I never flush.

Finally, as to the technique of gastro-jejunostomy, for years I have performed the Mayo operation. Theoretically the anastomosis ought to be as near the pylorus as possible, and Finney's operation should be better. Practically it does not seem to matter. I have never found it necessary to do entero-anastomosis as well, and have only had one case of vicious circle, years ago, after an anterior long-loop operation.

DISCUSSION.

Mr. GORE GILLON, who had previously shown at the Auckland Hospital four cases of gastro-jejunostomy with entero-anastomosis for duodenal ulcer, explained that he advocated and, for the last two years and a half practised, a short-loop gastro-jejunostomy combined with an entero-anastomosis. He claimed that all of his cases were completely cured and never returned for subsequent operation, and that the operation only took one hour and ten minutes to perform; the patients did not vomit afterwards, and did not need to be kept in an erect posture, but could lie back comfortably in bed, thus lessening the strain on the abdominal stitches. The recovery in every case was rapid and comfortable. He said that it seemed to him that this method brought about a more natural state of things, in that the bile, &c., entered the food-stream 2 in. below the stomach-opening, and hence there was no regurgitation of bile. Incidentally, this double operation was a preventive of sea-sickness in after-life, as he had proved in three of his cases. He felt sure that the present fashionable method of "no-loop" operation was responsible in a large number of cases for the not infrequent miserable condition of the patients after that operation. In his operation two pairs of gloves were used. The number of cases of duodenal ulcer he had operated on in the last two years and a half numbered twenty-six; in all of them he did an entero-anastomosis as well as a gastro-jejunostomy at the same time, and there was never any peptic ulcer resulting.

Prof. BARNETT (Dunedin) complimented Dr. Fiaschi and Mr. Syme on the excellence of their treatment of a difficult subject, and said that he did not know what really was the cause of the ulcer. He spoke of a complicated case in which he did an anterior gastro-jejunostomy, as well as entero-anastomosis, and afterwards had to undo this operation and perform a posterior gastro-jejunostomy; and he had found a peptic ulcer at the site of the entero-anastomotic opening. He was opposed to adding entero-anastomosis to the operation of gastro-jejunostomy.

Dr. MILLS (Sydney) spoke as a physician, and said that he knew of many lamentable results of the present fashionable method of treating duodenal ulcer by operation; he pointed out the importance of operating only where there was definite obstruction at or near the pylorus, and also that in gastro-jejunostomy the opening should be made at the antrum pylori. He also advocated that the patient after the operation should remain under a physician's care.

Mr. HAMILTON RUSSELL (President) drew diagrams to illustrate the difference between the loop, and the more recent no-loop, operation, and pointed out that the latter operation got rid of some of the faults inseparable from the former.

Dr. GORDON CRAIG spoke of, and described, Finney's operation, and stressed the value of gastroscopy in diagnosis of stomach ulcers, a method he has seen used in America.

Dr. THOMAS (Manly), speaking as a general practitioner, said that the usual method of posterior gastro-jejunostomy interfered with nature's plan, and he approved of Finney's method. He agreed with an immediate gastro-jejunostomy in perforated duodenal ulcer.

Dr. ACLAND (Christchurch) advocated the no-loop posterior operation which did away with the necessity for an entero-anastomosis. He thought it was a good thing that some bile could get into the stomach, and neutralize the hyperacidity of the stomach, which was the cause of irritation of the ulcer.

Dr. MORTON (Sydney) said he did not approve of gastro-jejunostomy being done at the same time as the suturing of a perforated ulcer. Free drainage should be provided. He also spoke of the symptoms of some right movable kidneys being similar to those of duodenal ulcer.

Dr. FIASCHI briefly replied.

THE SURGERY OF DYSPEPSIA.

By James T. Mitchell, M.D., Ch.M., M.R.C.S.,

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I have selected as the subject of my paper a condition which lies on the borderland between medicine and surgery. The sufferers from dyspepsia usually seek advice from the physician in the first place, or else they are led by specious advertisements in the public Press to treat their own symptoms by drugs of greater or less efficiency which, by giving temporary relief, may induce them to abstain from medical aid till much needless suffering has been endured, and frequently also till a disease has progressed so far that the possibilities of complete and ultimate cure are considerably lessened.

I make no claim to any originality in my remarks. My object in writing is to emphasize the fact that there is an increasingly large number of cases of dyspepsia in which it is found that the cause cannot be removed, and the symptoms, possibly, not even temporarily relieved, by medical or dietetic means. We all meet these cases in our daily work. Sometimes they may appear to us as trivial and uninteresting, but the sufferings are real enough to our patients, and it is our duty to find out the cause and suggest the remedy.

For a quarter of a century surgery has been encroaching upon the domain of medicine in many directions, but in none more markedly, or with more justification, than in diseases and disturbances of the alimentary tract. Naturally, the most obvious diseases were the first to come under the surgeon's care, but by degrees many others, some of which were regarded as "functional" or neurotic, were recognized as cases which could be relieved, or perhaps cured, by surgical assistance.

Improvements in diagnosis and clearer conceptions of the complicated reflex nervous phenomena of the peritoneal viscera have made it daily clearer that it is frequently necessary to look a long way from the stomach for the cause of marked stomach-disturbance. Even now, from time to time, quite lively discussions take place on the relation of these far-away causes to the obvious symptoms, and divergent views are frequently expressed upon the diagnosis, treatment, and the after-effects of various operative procedures. We must always strive to avoid a simple *post hoc* or even to the giving of undue weight to surgical aid, when much may have been gained by rest in bed, mental and moral effects, and so on. But, avoiding these fallacies, we must frankly acknowledge that very many cases of gastric disturbance are relieved or cured by surgery when, apparently, they are otherwise incurable.

For simplicity I have divided the causes into—(1) Those within the stomach; (2) those more or less remote from that organ.

Into the first group naturally fall pyloric obstruction, dilatation of the stomach, gastroptosis, ulceration of the stomach, and malignant growths in its walls.

In the second group are placed oral sepsis, ulcer of duodenum, gall-stones, perigastric and other abdominal adhesions, chronic appendicitis, floating kidney, tuberculous peritonitis, hydatids of diaphragm, abdominal walls and viscera, uterine and ovarian tumours or displacements.

Pyloric obstruction, when due to simple cicatricial contraction, or other fibrous overgrowth, possibly due to gastritis, has frequently been treated by my colleagues, especially in my earlier years of hospital-work, by Loretta's method—dilating from within by means of a well-guarded forceps and fingers. Good results have undoubtedly followed this procedure, but I have never personally undertaken it, because it always appeared to me to be so much more straightforward and satisfactory to short-circuit the track by a gastro-enterostomy, and thus avoid the possibility of subsequent recurrence of constriction from the original cause. If this short-circuiting be done by opening the posterior wall of the stomach and uniting it to an orifice in the jejunum, prompt and permanent relief is given in the majority of cases, provided care has been taken to see that the stomach-orifice is about 1 in. from the lower border, and that the jejunum be so attached that its peristaltic waves run in the same direction as those of the stomach. I have used the same method with good effect in two cases of hour-glass contraction of the stomach following the drinking of strong alkalies.

Dilation of the stomach is frequently overlooked, especially in women about the menopause, although it can be so easily demonstrated by X-ray screening after a bismuth meal, or even by percussion after effervescent drinks have been administered. The chronic condition, induced either by catarrh or by pyloric obstruction, can scarcely be relieved in any other way than by surgical operation. Naturally, if there be obstruction to the exit of food from the organ, this obstruction must be removed or circumvented. Simple chronic dilatation may fairly be treated by dietetic or medicinal methods for a reasonable time. But when these have failed I have given immense relief by a somewhat simple surgical procedure. My method is to make a longitudinal pleat in the long axis of the stomach, infolding an appropriately large section of the anterior wall by two layers of sutures, the first through serous and muscular coats and the second through serous only, embedding the first layer. This leaves a longitudinal ridge within the viscus, and rotates the lower border slightly forward. These things do not seem to interfere with peristalsis, and the good results obtained have made me hesitate to put the patient to further risk in manipulation, by either making a similar fold in the posterior wall or by excising the segment.

Gastroptosis, more or less general, is a by no means uncommon condition, and it is frequently the direct result of tight lacing. One finds by far the greater number of sufferers among women, more especially those of the leisured class, and who affect fashionable attire. But men are not exempt, although the cause in their case is not so evident. As a special exciting cause, right-kidney displacement is common enough. The gastric disturbances are due to the fact that the stomach has considerable difficulty in emptying itself of its contents, which tend to undergo fermentative processes. At an early stage there is diminution of the digestive power of the gastric secretions, with increased difficulty in the digestion of foodstuffs. The patient gradually reduces herself to a monotonous diet-scale, through finding that first one thing and then another disagrees with her. With this monotony comes loss of appetite and consequent further lessening of digestive power. And the flatulent distension of the stomach from the gases of fermentation causes a considerable amount of misery generally.

Ulcer of the stomach or of the duodenum, of the chronic variety, falls under the care of the surgeon when medical methods have failed to give more than temporary relief after a fair trial. In such cases an exploratory laparotomy is imperatively called for, in which the surgeon will quickly decide upon the most useful procedure. Should an indolent ulcer be found, with hard and thick edges, I have found that the best course is to dissect the ulcer right out, and close the wound with a double row of catgut sutures. The recovery is especially rapid and brilliant if this has been accomplished before perforation has taken place. In one case of ulcer of the duodenum I was able to dissect out the ulcer, making the long axis of the ellipse in the long axis of the bowel. Then the two end points were approximated, and the cicatrix was thus left in the transverse axis. By this manoeuvre there was no narrowing of the calibre of the duodenum. But in many cases of ulceration of the stomach, as well as of the duodenum, it has been found to be a more simple procedure to perform a gastro-jejunostomy, and by this new orifice to ensure rest and relief while the ulcer has a chance of healing. One can only describe the improvement in the patient's condition in many cases as magical.

Foreign growths in the stomach of a malignant character must, if at all possible, be dealt with by gastrectomy, either partial or complete. I have personal experience of three cases where the patients have lived from twelve to twenty-three months in comparative comfort after removal of the greater part of the stomach.

Oral sepsis is one of the most obvious, and yet so frequently overlooked, causes of indigestion. This may be the result of dental caries, pyorrhoea alveolaris, or of some mucous epithelial infection. Dental caries may affect the stomach-contents mechanically, through failure in mastication, or, less obviously, by the swallowing of masses of decaying foodstuff or foul pus. It is our business to detect dental caries in this connection, and then to pass the patient on to the dental surgeon for appropriate treatment. Pyorrhoea alveolaris causes trouble directly, in much the same manner as dental caries, but it has no doubt frequently been the exciting cause of malignant growths, either in the stomach itself or in other portions of the alimentary canal. An early history of pyorrhoea may not seldom be worked out in cancer of the stomach. We have only to think of the great percentage of malignant cases in which the new growth is situated in the alimentary tract to admit the strong probability of a connection between the two conditions. We cannot speak too confidently of the success of treatment of pyorrhoea. Personally, I have almost despaired at times, after the use of mouth-washes and tablets, injection of various antiseptics into the periodontal spaces, ionization with zinc and iodine ions, and autogenous vaccines. There is no panacea, no royal road to success, and it is at times necessary to remove quite a number of loosened teeth before this tiresome condition can be at all got under control.

Gall-stones frequently give rise to insistent and even intolerable digestive disturbances, and when the calculi are in the gall-bladder or the cystic duct they may give no other evidence of their presence. Frequently, however, paroxysms of colic pain may occur, but even then the patient is apt to regard these as due to flatulence. It is remarkable on how slight a provocation, or perhaps with no known provocation, these attacks of indigestion will come on when gall-stones are present. It is a noteworthy fact that a previous history of typhoid fever is a good clue to a correct diagnosis. A good routine practice is to examine thoroughly the bile-tracks when there is a history of repeated dyspeptic attacks, and one is surprised at the frequency with which one is able to discover, on deep pressure, a tender point in the gall-bladder area. This is more marked whenever the calculi have induced cholangitis, which may of itself become so severe that the gall-bladder is reduced to an abscess cavity, and must be removed *en bloc*. Stress has been laid on the presence of hyperchlorhydria as a significant symptom. My own experience leads me rather to diminished acidity as the more usual condition. Considering the danger of malignant disease of the liver, stomach, or pancreas, following gall-stone irritation, I am strongly of opinion that biliary calculi should invariably be removed as early as their presence can be diagnosed.

A closely allied condition is abscess of the liver, of which I have recently treated two cases, where dyspepsia was the only symptom calling for treatment. In the first of these cases I did not discover the cause till the abscess had slowly made its way to the surface. In the second case I was more alert, and was able, by direct drainage, to give absolute relief to the stomach symptoms.

Adhesions within the peritoneum gave rise to much gastric disturbance, and may be due to many causes. Tuberculous peritonitis is probably the origin of the most extensive and widespread adhesions, and these, when in the perigastric region, are probably the most potent cause. But adhesions much more remote give similar symptoms, and cannot be easily located. Those due to appendicitis either before or after operation, omental attachments, bands about the colon or coils of the small intestine, adhesions about the brim of the pelvis resulting from salpingitis—all these give rise to distressing stomach-disturbances, which are only relieved by the division of the offending tissues, which are not likely to recur if half a pint of sterilized olive-oil be poured into the abdominal cavity in the neighbourhood of the raw patches of peritoneum.

Appendicitis, in its subacute or chronic forms, is one of the commonest indirect causes of indigestion. It is only within the last few years that this has been properly recognized, although every one of us must frequently have remarked on the immense improvement in general health after the removal of an appendix. Curiously, the gastric disturbance does not seem to depend altogether upon the adhesions about the caecum, for we have seen perfect relief from symptoms even when the appendicitis has been simply catarrhal, or the organ kinked sharply upon itself, with some obstruction in its lumen. It is by no means an uncommon experience to have gastric relief follow upon removal of the appendix, when the relation between the two conditions was never suspected. In my own practice two cases of so-called nervous dyspepsia were absolutely cured by such a removal. How very frequently do obscure subacute abdominal attacks occur that can only be sheeted home to the appendix by careful and repeated observation and examination. If this be so with simple uncomplicated chronic cases, how much more true is it when there are adhesions of appendix to intestine, abdominal wall, omentum or uterine appendages? In this condition the gastric disturbances are more easily understood.

Floating kidney is marked by many well-known signs and symptoms, but I venture to say that of all of them gastric disturbance is the most constant, and is usually the symptom which drives the patient to seek advice and makes him willing to undergo what appears to him somewhat heroic treatment. I do not overlook the severe attacks of local pain caused by kinking of the ureter, or dragging on the pedicle, which are unfortunately less common than the stomach symptoms. We have all come across many cases that have been dosed for years with every drug that can act upon the stomach or intestines, with but temporary relief, which have received permanent benefit within a few months of nephropexy. For this movable kidney I frequently advise a well-fitting abdominal belt, with a pad to restrain the movements of the organ. But the almost universal experience is that with the best of these appliances the kidney from time to time slips down below the pad, and causes much inconvenience till it has been replaced. More than half of my cases that have been so treated have grown thoroughly weary of the annoyance of the belt, and have begged for something more satisfactory. This result is invariably secured by stitching the kidney in its normal position, through a lumbar incision. My routine method is to split up the capsule for about half the length of the kidney, and secure each wing to the lumbar aponeurosis at the sides of the wound by catgut sutures. Two silkworm-gut sutures are then brought through all the tissues from the skin and passed through the body of the kidney. The upper of these is usually placed above the twelfth rib, and the lower one just below the rib. The silkworm-gut is removed on the tenth or twelfth day.

Tuberculous peritonitis, even before it leads to adhesions between the viscera, is marked by attacks of dyspepsia. Indeed, in its earlier stages there is frequently no other evidence of its presence. When the tuberculous deposits are very numerous and widespread they must cause profound changes in the character of the secretions of the gastric and intestinal glands, while the peristaltic movements must be correspondingly hampered, leading to sluggish movement of the contents of the viscera. By the time that fluid is poured out into the peritoneum in any quantity the diagnosis is obvious. But prior to this the patient has probably been subjected to courses of homely or pharmaceutical remedies, with disappointing results. But this same outpouring of fluid increases the digestive difficulties by mechanical pressure. Free opening of the peritoneum, draining of the fluid, and letting in light and air seem the most effectual if not the only means of dealing successfully with this diseased condition. The marked improvement which has followed very many cases under my care has caused me to regard this as the routine treatment, although I frankly confess that I cannot explain its rationale. Bier has suggested that oedema of the tissues follows the laparotomy.

Hydatids are very prevalent in my own neighbourhood, and I have frequent opportunities of observing their behaviour in causing more or less profound digestive disturbance. Most frequently, no doubt, their ill effects are due to gradually increasing pressure diminishing the lumen of hollow viscera. But we must also recognize the fact that depraved secretions of the various organs are the result of the pressure of the ever-growing cyst, which interferes with both blood and nerve supply of the organ. I find the parasite in the liver, the diaphragm, omentum, mesentery, and in various parts of the alimentary canal itself, upsetting digestion, either mechanically or otherwise. For this, whatever the position of the hydatid cyst, there is but one method of treatment—namely, the destruction of the parasite, with the removal of the endocyst if possible, and marsupialization of the ectocyst if it be at all practicable.

Ovarian tumours, in common with uterine tumours and displacements, may cause a great deal of stomach-disturbance by reflex nervous irritation. The correction of the uterine displacement is often a comparatively simple procedure, giving marked relief. But when tumours attain any size they cause trouble from pressure, or from stretching and displacement of the organs. Quite recently I found a uterine myoma which had enlarged backwards and upwards behind the peritoneum, and had pushed forward all the viscera except the kidneys. It extended well up under the lower margin of the left ribs, and its removal was most difficult, in that it could only be shelled out from its peritoneal sheath. The flatulence that had been so distressing was promptly and permanently relieved.

IODOFORM BONE-PLUGGING IN CHRONIC OSTEOMYELITIS AND TUBERCULAR DISEASE OF BONES AND JOINTS.

By T. F. Ryan, M.B., Ch.B.,

Surgeon to Nhill Hospital, Victoria.

The surgical treatment of the lesions of bones and joints following on acute infective osteomyelitis, tubercular disease of bones and joints, is generally of a tedious nature, and the accepted methods of chiselling and scraping are, to my mind, not so satisfactory and expeditious as that introduced in Vienna by Moorhof some years ago.

I have been practising the method for about five years in a fairly large number of cases, and I know of no other method that allows healing to go on while the patient often can follow his usual occupation without any material inconvenience, after a time varying from a week or two to a few weeks.

The cases that most frequently present themselves for treatment are children who have had an attack of acute infective osteomyelitis, and sinuses remain leading down to cavities in the bone.

We may take as an illustration of this method the humerus which has been the seat of an acute manifestation of the disease, and has now settled down into a number of sinuses leading down to cavities in the bone.

The material is prepared a couple of days beforehand by using the finest pulv. iodoform 1 dr. to 1 oz. of spermaceti. This mass becomes fluid at a temperature of 112° F., and hard at the ordinary temperature of an operating-theatre.

The iodoform is sterilized in a 5-per-cent. solution of carbolic, filtered and allowed to dry in a sterilized vessel before mixing with the spermaceti.

It is put into glass tubes with rubber stoppers or glass syringes ; it solidifies in these receptacles, and a few minutes before it is needed a nurse puts the glass tube into a receptacle containing hot water at a temperature of about 120° F., and keeps the mixture agitated so as to have a fairly equal distribution of the iodoform through the spermaceti.

The instruments I have used in the operation are ordinary carpenter's chisel and a mallet. No Esmarch bandage is used, and the limb is not elevated before operation. The scar-tissue surrounding the sinuses is removed by elliptical incisions, the periosteum is peeled back with elevators, and the mallet and chisel are used freely to cut a trough-like cavity with nearly vertical sides. All diseased bone is removed, until the cavity is tolerably clean. Large burrs attached to an electrically driven motor are then used to make a smooth even hard surface. The motor lessens excessive bleeding, which, however, never causes any trouble. In my first case I used adrelain chloride, but discontinued it later. The cavity is next dried with hot air by means of an electric apparatus. The packing-mixture is now poured into the cavity, and it is necessary to see that it reaches all the parts of the cavity, and filled flush with the opening in the bone. At this stage it may be necessary to use a metal spatula to fashion the superficial surface. In a few minutes the mass hardens and the periosteum can now be stitched with catgut, the skin and underlying structure united with interrupted silkworm-gut sutures, and the limb put on a poroplastic splint. No drainage material is used.

In many of the cases there has been very little rise of temperature, and the local and general condition has been satisfactory.

In the case of this humerus the bone was chiselled and burred out from epiphysis to epiphysis, and you will now see, about four months after the operation, the plugging has been replaced by osseous tissue.

In one case where a cavity in the femur 7 in. long by 1½ in. deep was filled with a mixture, there was a very small percentage of iodine excreted in the urine for seven days, when it disappeared. Absorption can only take place from the peripheral portions of the plug, and this must be small in amount. In my first case, tubercular disease of the right ulna, the case had been treated for two years elsewhere by scraping and chiselling, but the sinus still remained. The cavity was prepared in the way I have indicated, and was about 2 in. long, ¾ in. broad, and 1 in. deep, when all diseased tissue was chiselled and burred. It was sewn up without drainage, and the patient, who was a house-painter, was hard at work in sixteen days. The skiagraph shows the gradual absorption of the plug, and its final disappearance three months after operation, and its replacement by osseous tissue. In all the skiagraphs after operation there will be seen a halo of granulation tissue round the plug ; this eventually becomes osseous.

There is sometimes serous oozing for a couple of days through the skin-incision between the sutures, but generally there is healing by first intention.

In a case of a boy fourteen years of age with a cavity in the head of the humerus, he was using the arm in a week, the healing of the soft tissues having taken place.

I have extended this method in a case of excision of the head of the femur in a child, with a cure of the disease and a resulting movable joint.

I would suggest its use in arthroplasty of a joint where there was no available fascia in the vicinity of the joint, and especially in the case of the patella. It would last sufficiently long to prevent the patella becoming united to the condyles of the femur.

The skiagraph of the femur is one of chronic osteomyelitis, and in this case the trough produced after chiselling and burring was 7 in. long, 1½ in. deep, and 1¼ in. wide, and embraced about two-thirds the length of the femur. It was filled with the crystalline iodoform and spermaceti, and the whole wound healed by first intention, without any rise in the temperature.

The other case was one of tubercular disease of the tibia, having a sinus leading to the cavity of two years' duration. This cavity when prepared was 5 in. long by 1½ in. wide, and healed by first intention.

In the case of a large trochanteric bursa that had become infected, I operated with the intention of removing the lining-wall, but it had burrowed to such an extent that it was considered too difficult to do so. I used the mixture by injecting a quantity by means of a glass syringe, and, although some of the particles were gradually extruded, it has healed up very firmly.

To ensure the success of the operation one must excise infected skin freely, peel back the periosteum, remove all bone anterior to the cavity. This is best done with a sharp carpenter's chisel ½ in. in width, and a strong copper mallet; a large burr rapidly driven to make the walls smooth, and hot air to make them dry. It is very necessary also to clip the edges of the periosteum with gauze, otherwise hardened portions of the filling may become scattered through the soft tissues. In any case, this makes no difference in its absorption.

Summed up, the treatment is expeditious, and the opportunities for its application occur in the practice of most medical men. It permits the patient to follow his usual work in a short time, as compared with the usual operative methods of treating bone cavities the result of tubercular disease or chronic osteomyelitis.

OBSERVATIONS ON THE TREATMENT OF HYDATID DISEASE.

FROM THE POINTS OF VIEW OF—(1) PROPHYLAXIS; (2) ASPIRATION OR TAPPING; AND (3) THE NO-DRAIN OPERATION OF BOND AND OTHERS.

By L. E. Barnett, F.R.C.S.,

Professor of Surgery, University of Otago.

I may say that these observations are based, firstly, upon a personal experience of 302 cases in hospital and private practice; secondly, upon a study of well-nigh all the literature of hydatid disease published in Australasia, the Argentine Republic, France, and Germany; thirdly, upon personal verbal and written communications with the leading surgeons and public health and veterinary authorities in various parts of the world where hydatid disease is common. I wish here to express my gratitude to many of my colleagues in Australia and New Zealand for their kind aid and interest in my work, notably to Mr. Reakes and Mr. Snowball, of the New Zealand Veterinary service; Dr. Valintine, Inspector-General of New Zealand Hospitals; Professor Watson and Dr. Todd, of Adelaide; Mr. Syme and Mr. Hamilton Russell, of Melbourne; Sir Alexander McCormick and Dr. Ashburton Thomson, of Sydney; and Dr. Acland, of Christchurch. I desire also to acknowledge the valuable help I have received from the personal letters and published writings of Dr. Daniel J. Cranwell, of Buenos Aires, one of the most eminent authorities on the subject of hydatid disease.

The Prophylaxis of Hydatid Disease.

Pathologists and surgeons of Australia have made many valuable contributions to the literature of hydatid disease, and at the fourth and fifth Intercolonial Medical Congress held in the years 1890 and 1893 the subject was fully discussed, especially from the point of view of operative treatment. One important result of these meetings and of the publication of the transactions has been the universal and complete condemnation of the old operation of aspiration or tapping for hydatid cysts. Never before, and in no other country, were the pros and cons of open incision *versus* blind puncture so thoroughly demonstrated, and undoubtedly to the Australasian Medical Congress is due the credit of this great advance. A further stage in the evolution of operative treatment—namely, the no-drain operation of Bond, of Leicester—has been widely approved by Australasian as well as Argentine surgeons, and their published experience has done much to establish this technique on a sure basis.

At none of our previous Congresses, however, has the prophylaxis of hydatid disease been considered, and this strikes me as being a subject of paramount importance in countries like ours, more or less infested with the hydatid parasite—a parasite which I maintain could by vigorous action be practically eliminated, and the welfare of the community thereby benefited. Another point which has not yet been sufficiently stressed in connection with the prevention of hydatid disease is that by the adoption of safeguards presently to be detailed a very decided diminution in the prevalence of this malady amongst stock animals could be ensured, with a corresponding enhancement of the value of one of our leading Australasian industries. Sheep do not seem to suffer in condition as a rule, although liver and lungs may be extensively invaded by hydatids. If they had work to do, the difference between the infected and non-infected ones would no doubt become marked, but as stock animals have nothing to do but feed, sleep, and breed, they are able to maintain a good appearance, although perhaps half the liver and lungs are out of action. One may, however, reasonably conclude that both the wool and mutton of absolutely healthy sheep would be of greater value than that of diseased animals. Here, too, is another little point bearing on the economic aspect of hydatids in animals—a point not perhaps of very great importance, but still worth brief reference: As you are no doubt aware, the livers of sheep and lambs have a certain money value—exactly how much I am not prepared to say, but taking a very low estimate and assuming a sheep's liver is worth only 3d., then for each liver rejected by the abattoir inspectors as unfit for food a loss of 3d. or thereabouts would be incurred. Now, in New Zealand alone during the last ten years there have been over 32,000,000 sheep, not including lambs, killed for food, and on the above basis of calculation there might have been a saving to the sheep industry of no less a sum than £200,000—a sum which represents the money value of the estimated proportion of sheep's livers (50 per cent.) rejected during that period of time.

In all great sheep-raising countries hydatid disease is common, particularly so in the Argentine Republic, our great rivals in the frozen-meat industry. The Argentine Government are more alive to the importance of stamping out this noxious parasite than are the authorities in our own countries, and have wisely installed a vigorous campaign calculated to lessen the prevalence of hydatid disease in both man and animals. Personally, as a patriotic citizen of New Zealand, I am particularly interested in the welfare of this little Dominion, and I want to see it as healthy and as prosperous as the energetic brains and the muscles of its inhabitants can make it. I want particularly to see it, in common with the Australian States, ahead of the Argentine Republic, and anything directed to the improvement of the health of the community and to the health of the stock animals will help in this direction. Our Government, through their Departments of Public Health and Agriculture, stimulated from time to time by the representations of the medical profession (amongst whom I include our colleagues the veterinary surgeons), have done something to cope with this hydatid evil, but not as much as I think the occasion demands, and nothing like as much as they have done for orchard pests and noxious weeds. Against hydatid disease a more vigorous attack is called for—an attack necessitating perhaps the expenditure of money, though such outlay is not likely to exceed very modest dimensions, and would be very trifling indeed compared with that which is nowadays very properly devoted to the campaign against tuberculosis.

The enlightenment of the public in New Zealand as to the nature and prevention of hydatid disease has been so far almost entirely left to the individual efforts of medical practitioners. I have personally done my best to help in this direction, and for many years I have taken some pains to educate the people on this subject through the medium of anonymous contributions to newspapers and to the *School Journal,* and by making pointed reference to hydatid disease at Medical Congresses.

I am encouraged to believe that even with limited efforts of this nature a considerable diminution in the number of cases occurring in human beings may be confidently anticipated.

I have collected a mass of statistics bearing on the prevalence in New Zealand of hydatid disease in man and animals, but will select for my purpose only a few figures of special interest.

In August, 1909, I published a paper in the November issue of the *New Zealand Medical Journal* on the prophylaxis of hydatid disease, and quoted statistics to show that the incidence of hydatid disease in New Zealand appeared to be rising in human beings to an alarming extent, and that approximately 50 per cent. of our stock animals were infected. The figures of more recent years which I am now able to cite indicate a very gratifying change of the tide, at least so far as human beings are concerned, and they encourage one to believe that the extension of the methods already employed to educate the public will go far to eradicate the hydatid evil.

Cases of Hydatid Disease in the Four Chief Hospitals of New Zealand for Five-year Periods.

——	Auckland.	Wellington.	Christ-church.	Dunedin.	Totals.
1898 to 1902 ..	13	24	28	58	123
1903 to 1907 ..	9	48	58	67	182
1908 to 1912 ..	6	28	43	42	118

This table demonstrates clearly a very marked decrease in the number of cases occurring in our four chief hospitals during the last five years as compared with the previous five—a total decrease of sixty-four, equal to 33 per cent. It indicates also how much less prevalent hydatid disease is in the North than in the South Island.

The scheme of prophylaxis, as I have on previous occasions explained, resolves itself, in the main, into a campaign of public instruction on the following lines:—

The people should be taught something of the natural history of hydatid disease—how the minute adult tapeworm, the *Taenia echinococcus*, exists in the dog, and the dog only; how myriads of the ova of this tapeworm are distributed in the excrement of the dog over the grass and over vegetation of fields, hillsides, and farmyards, and into the water of streams, lakes, ponds, and unprotected wells and reservoirs; how human beings, by drinking this contaminated water, or by eating uncooked vegetable food such as watercress, lettuce, celery, &c., may swallow these eggs, or may possibly become infected by direct contact with dogs which have been allowed to lick the hands or faces, or even the plates, in the owner's household; how these eggs, microscopic in size to begin with, germinate and grow and spread in the human body until finally, in the course of months or years, they produce the peculiar bladders in the livers, lungs, and elsewhere, known as the hydatid cysts; how in similar fashion other animals, especially sheep and cattle, become the hosts of these hydatid bladders; how, strangely enough, the dog which harbours the parent parasite, the little tapeworm (*Taenia echinococcus*), never develops the cysts or bladders as they are seen in other animals—that is to say, it is the source of cysts in other animals, but never itself suffers from them; and if a dog is fed upon cysts it develops in its interior not cysts, but the adult tapeworm. How important, therefore, it is—

(1.) Not to feed dogs on the raw offal of sheep and cattle containing hydatid cysts:
(2.) Not to drink unboiled or unfiltered water that has been open to contamination by dogs:
(3.) Not to eat watercress, lettuce, or celery, or other uncooked vegetables unless special care is taken to clean them thoroughly with pure water:
(4.) Not to permit dogs to lick hands and faces, plates and dishes, or to come too closely in personal contact with human beings.

In addition to the adoption of means to bring emphatically and frequently these essential items of information under the notice of the people, the Government health and veterinary authorities should—

(1.) Enforce regulations prohibiting the feeding of dogs on raw offal not only at abattoirs, but on farms and sheep stations:
(2.) Take steps to kill off all unregistered and useless dogs:
(3.) Provide every owner of a registered dog with printed information regarding hydatid disease, including instruction for ridding the dog's intestine of parasitic tapeworms by means of vermifuge medicine, such as areca-nut or male fern.

Lastly, in order to convey the information to the people concerned,—

(1.) There should be affixed prominently to every railway station and siding in the Dominion a large illustrated placard, indicating in clear and impressive fashion the prevalence of hydatid disease, its nature and how it is disseminated, and what means ought to be taken to prevent infection. It is my belief that a graphic representation of this kind brought frequently under the notice of the people will have far more influence than mere distribution of leaflets dealing with the subject. I am prepared to submit a sketch of such a placard based upon one that has been recommended for use in the Argentine Republic.

(2.) Newspapers, especially the weekly ones, should be asked to publish from time to time articles giving such information as I have detailed above.

(3.) At agricultural and pastoral shows there should be a Government exhibit of hydatid disease, and leaflets giving such information as I have detailed above should be distributed.

(4.) In all State schools instruction on this subject should be given by the teachers, either through the medium of the school-books or by demonstrations. (I published an article on hydatid disease in the New Zealand *School Journal* for May, 1908.)

Aspiration or Tapping as a Method of Treatment : Is it ever worth while ?

Twenty years or more ago an impressive record of risks and disasters associated with this method were brought prominently under the notice of the profession, chiefly by the Australian surgeons—Davies-Thomas, Sir P. Sydney Jones, R. Scott Skirving, B. Poulton, E. C. Stirling, J. C. Verco, A. A. Lendon, F. Bird, W. Gardner, and others.

I need only mention here that these ill effects included sudden syncope and collapse—leakage from the puncture causing toxaemia, urticaria, fever, peritonitis, cyanosis, pleurisy, dyspnoea, haemorrhage, bursting of the cyst, hydatid dissemination, &c. In the case of pulmonary hydatids the usual dangers are aggravated, and there is, in addition, the very imminent liability of rupture into a bronchus, and consequent flooding of the air-tubes with hydatid fluid, or blocking of the glottis with hydatid membrane. Dévé, of Rouen, has shown that in all probability a condition of anaphylaxis is responsible for many of the toxaemic manifestations.

Such a heavy indictment by esteemed authorities of this tapping procedure, otherwise attractive in its simplicity and at one time very widely employed, naturally relegated it into the limbo of surgical misfits. Active surgeons of to-day have had little or no experience of it, except possibly as an aid to diagnosis. But, of course, even for diagnosis, especially in lung cases, the same objections apply, and there is no doubt that in diagnosis as well as in treatment we ought to make it a rigid rule to abstain from blind puncture of hydatid cysts. Fortunately we have nowadays at our disposal aids to diagnosis that render superfluous this exploratory puncture. Particularly useful in this connection are—(1) X-ray examination by screen and photograph ; (2) the complement fixation test. And less reliable, but still of some assistance, are—(3) the precipitin reaction ; (4) the eosinophile count.

Is tapping, therefore, ever worth while ? There are exceptions to every rule, and I maintain that there are still one or two indications for tapping—for example, where the patient absolutely refuses a cutting-operation, and is willing to stand the risks of tapping, or if during a cutting-operation cysts are found in a situation where it is impracticable to do anything else but tap them.

I have in my own experience, and from the personal communications of my colleagues, noted very numerous cases where the tapping of liver-cysts has been apparently absolutely successful and curative, and, on the other hand, I have seen and heard a few cases where there have been failures and disasters, alarming symptoms, relapses, suppurations, and so on. I have been fortunate enough to escape personal experience of a fatal case, or, indeed, anything approaching to one.

Only a year ago I deliberately treated a case of hydatid cyst by puncture, with quite satisfactory result. The patient was an elderly woman, somewhat eccentric—one of those people who do not believe in operations, but anxious all the same that something should be done to relieve her very obvious distress. She had a very large cyst of the right lobe of the liver, displacing the heart so markedly as to cause serious dyspnoea, cyanosis, and oedema. She would sooner die, she said, than be cut with a knife, but she willingly submitted to tapping, and I drew off 60 oz. of hydatid fluid containing numerous scolices. To-day she is well and active, and so far shows no sign of hydatid recurrence.

On several occasions, too, when operating for multiple abdominal hydatids, I have come across cysts in awkward places—in the posterior mediastinum beyond the diaphragm, for instance, in the remote depths of the abdominal cavity under the spleen, under iliac vessels, and so on, where it was practically impossible to carry out a radical removal; and in these cases I contented myself with aspirating the cyst, and have had good reason to be satisfied with the results.

The technique of tapping does not call for special reference except in regard to two points, both depending on the well-known fact that the fluid in the hydatid cyst is at high tension and will literally spurt through the puncture hole: (1) The needle should be of very small calibre; (2) the cyst should be emptied of fluid as completely as is feasible. If these points are observed there is little risk of disaster from leakage.

The No-drain Operation of Bond and others.

This method should be adopted whenever practicable, in preference to that of Lindemann's mursupialization or other drainage procedures. Not only is the mortality less by half, but the time of convalescence is shortened by months, and post-operative complications are much less common. (*Tratamiento de los quistes hidaticos, Cranwell y Vegas.*)

The following conditions are usually regarded as contra-indications to a no-drain technique:—

(1.) Cholerrhagia or effusion of bile if at all pronounced. The necessity for drainage here depends not so much on the mere filling-up of the cavity with bile as on the fact that the bile in a large proportion of these cases is septic—perhaps only mildly septic, but sufficiently so as to lead on to suppuration and to toxic manifestations.

(2.) Suppuration, of course, calls for drainage; but, seeing that the infection is often of low virulence, a very temporary drainage for a day or two may suffice. Bond, Quenu, and Hamilton-Russell have all recorded cases where a suppurating hydatid cyst has been successfully closed without drainage. Moreover, cases treated without drainage sometimes show evidence of mild infection, such as feverishness, malaise, and tension in the hydatid sac, and these may be cured by one or more tappings of the reaccumulated fluid, no permanent drainage being required.

(3.) Haemorrhage from a cyst-wall.

(4.) Multivesicular cysts, which are probably always old cysts with dead or degenerated mother membranes, and in which it is difficult to be sure of completely evacuating all the daughter cysts at the first operation.

(5.) Cysts with rigid, leathery, or calcified pericyst walls which collapse badly, or not at all, after evacuation of contents.

(6.) Complicated cases, such as those that have ruptured into gall-bladder, intestines, pleura, bronchus, &c.

It is well to remember that although there may be no perforation communicating with the interior of the hydatid cyst, yet after the removal of the parasite a defect in the pericyst may be noted, and, especially in cases of pulmonary hydatid, should always be looked for. The presence of muco-pus on the outer surface of the ectocyst membrane is evidence of such perforation, and calls for at least temporary drainage.

The Technique of the No-drain Operation.

There are, of course, many modifications of Bond's original technique, and much diversity of opinion exists on the questions of suturing and anchoring the pericyst. Some surgeons, too, pay little heed to the risk of post-operative recurrence due to the grafting or dissemination of hydatid material, but the record of 130 cases quoted by Quenu and by Cranwell and Vegas, and my own personal knowledge of eight such cases, have led me to adopt the formolization method of Dévé.

The following description of an operation for hydatid cyst of the liver illustrates the technique I am accustomed to carry out: Mrs. P. R., age thirty-seven, operated on in Dunedin Hospital, 21st July, 1913. Vertical incision over the bulging cyst just to right of mid-line for 4 in. downwards from thoracic margin, splitting through the right rectus abdominis. Abdomen opened; exploration made with whole hand inserted into abdominal cavity from diaphragm to pelvis. No other abnormality was detected. The bulging pericyst was carefully surrounded with gauze packing, so as to shut off the general peritoneal cavity and the raw surfaces of the wound from gross leakage. A gall-bladder trocar and canula was plunged deeply into the cyst, and 44 oz. of watery fluid containing much hydatid sand was drawn off and carried by a tube into a basin below the level of the patient. As the fluid escaped the pericyst became flaccid, and permitted the careful application of strong tissue-forceps, one on each side of the trocar puncture. With these forceps the pericyst was by degrees drawn strongly up to and beyond the level of the abdominal wound, and thus the risk of peritoneal contamination was further lessened. When liquid ceased to flow a funnel was attached to the tubing, and the cyst cavity tightly filled with 1 per cent. formol solution with the idea of killing the scolices. The anaesthetist was now directed to stop the administration of ether, and a wait of five minutes' duration ensued. Then the solution was run off and the pericyst opened by a 2 in. incision.

Care was also taken to see that the trocar did not shift its position to any extent, so that the formol was delivered right inside the mother cyst, and not between it and the pericyst. Two arteries spurted blood from the cut pericyst, and were ligated with catgut ; the edges of the cut were held open with retractors, and the white mother membranes could be seen within. As a result of the stoppage of ether the patient began to strain, and this facilitated the evacuation of the collapsed cyst. The ectocyst was gently coaxed and manipulated with the help of gauze-covered forceps, gauze pads, and the fingers, until finally the whole of the mother membranes, intact except for the 2 in. incision, were delivered. The cavity was carefully dried with gauze pads, and then explored with the finger. A second large cyst was in this way discovered bulging into the roof of the first one. Again the trocar and canula was called into requisition, and the second cyst tapped, formolized, incised and evacuated of its membranes. It proved to be a larger cyst than the first, and the yellow staining of the gauze swabs used revealed the presence of a slight biliary effusion.

The cut in the pericyst was next sewn up completely with a double line of continuous suturing, using chromicized catgut No. 1 and a round needle. The abdominal pads were removed, and the exposed surfaces bathed with warm saline solution. The pericyst at the line of suture was anchored to the peritoneum of the abdominal wall by four interrupted catgut ties, so that if necessity should arise later the cyst can be easily tapped or reopened. The abdominal walls were then united in layers as usual, using catgut, silkworm-gut, and Michel clips, a dressing applied, and the patient returned to bed. The wound healed by first intention, the convalescence was smooth, and the patient left the hospital in seventeen days, apparently perfectly well, and has since remained free from any symptoms of trouble.

The Prevention of Post-operative Recurrence

has not so far been discussed at any Australasian Congress. Thanks to the researches of Lebedeff and Andreef (1889), Alexinsky (1898), and Dévé (1900), we all know that both daughter cysts and scolices can escape from the parent cyst and grow in the abdominal cavity or in other tissues ; and it would, I think, be well to get the opinion of our leading surgeons as to the best technique to be employed in order to lessen this slight but undoubted post-operative risk. Personally I favour the method of Dévé, as above described.

Suture of the Incision in the Pericyst

is always advisable in liver-hydatids where an effusion of bile more or less septic may occur, because if the pericyst is left open and there is no external drainage provided for, then there is a serious risk of sepsis spreading to the abdominal peritoneum. Fatal cases of this kind have been recorded.

There is, however, no need to suture the pericyst in simple cases of hydatids of omentum or mesentery, pedunculated cysts of the liver, or, indeed, in any case in any part of the body where, given a clean technique, there is no likelihood of a septic effusion within the cyst. The cases one has to be particularly careful about are the liver-cysts, on account of the possibility of septic bile, and the pulmonary cysts, on account of the possibility of a septic communication with a bronchus.

Anchoring the Suture-line of Pericyst to Abdominal or Thoracic Wall is in my opinion advisable when operating on liver or lung hydatids, and for this reason: that a septic effusion will occur in a certain proportion of these cases, perhaps 25 per cent. of them, and secondary drainage can be more easily and safely provided for if the pericyst is adherent close under the surface wound. Should symptoms arise suggestive of sepsis in the closed sac, a trocar and canula can be safely and easily inserted, and one or two vacuations of the accumulated fluid through the trocar may obviate the necessity of tube drainage. If a tube is called for, a pair of sinus-forceps can readily make a passage for it through a convenient part of the surface wound.

Although Bond, in 1891, fairly established the no-drain technique for abdominal hydatids, somewhat similar procedures had been previously recorded by Thornton in 1883 and Bilroth in 1890.

Surgeons in Australasia—Moore, Syme, Hamilton-Russell, and myself, amongst others—have from time to time during the last twenty-two years operated on hydatid cysts without drainage; and although at previous Australasian Medical Congresses the no-drain technique has received scant consideration, yet there is now undoubtedly an increasing tendency in Australia and New Zealand in favour of this improved procedure.

In the Argentine Republic, where the leading surgeons have had unrivalled opportunities for studying hydatid disease, the no-drain technique has been for many years firmly established, and Posadas, Cranwell, Vegas, Escudero, and others have given most encouraging records of their experience with the numerous cases operated on without drainage.

Personally, I have found that with increasing experience of the no-drain methods a larger and larger proportion of cases can be carried to a speedy and successful termination, and, provided that due regard is paid to the contra-indications previously enumerated, I most emphatically recommend this method as the operation of election.

In the discussion which followed the reading of the above paper Dr. H. T. D. Acland, of Christchurch, expressed himself as in favour of the technique described, and in order to emphasize the risk of post-operative recurrence he read the following notes of cases that had occurred in his experience:—

Case 1.—H. P., male. At age of thirty-four years was operated upon by me in Christchurch on the 21st January, 1905, for suppurating hydatid cyst of the liver. There was one large cyst of under-surface of the left lobe of the liver, which extended upwards beyond the mid-line 1 in. to right. There appeared to be several small exogenous cysts in the sac-wall. The sac was sutured to the abdominal incision and drained. Suppuration continued for four months, during which time many small cysts continued to come away with the discharge. A second operation was done on the 5th September, 1910, for a hydatid cyst of the abdominal wall in connection with the old scar and two cysts of the omentum just beneath the scar. The cyst of the abdominal wall was clearly an implantation cyst.

Case 2.—Mrs. M. S., at the age of fifty-two years, was operated upon by me in the Christchurch Hospital on the 21st September, 1904, for a large single hydatid cyst of the right lobe of the liver, which extended upwards between the liver and diaphragm. The incision was made parallel with the costal margin, its centre being in the mid-clavicular line. The sac was sutured to the abdominal incision and drained; suppuration occurred, and drainage became unsatisfactory, with evidence of pus posteriorly. Serous effusion occurred in the right pleural sac. Later this became purulent, and was drained through an axillary incision, portion of the 6th and 7th ribs being excised. Pus was found both above and below the diaphragm. Patient left the hospital January, 1905. In May, 1911, I saw her again, when she complained of shortness of breath and cardiac distress. I could find no evidence of recurrence. In March, 1913, there was evident recurrence in the thorax. I operated through the old axillary incision, and found three large cysts containing from half to three-quarter pint of clear fluid each between the diaphragm and lung. Besides these cysts there were several ones embedded in fibrous tissue about diaphragm and above surface of the liver. Following the operation there was prolonged suppuration, with discharge of cysts, varying in size from a small pea to a pigeon's egg. Finally, after expectorating some foetid pus, she made a good recovery. Hers was evidently a case of implantation of hydatid elements during the period of suppuration following the first operation.

Case 3.—Mr. H. M. E., at age of twenty-one years, was operated upon in Timaru in 1906 for hydatid cyst of the liver which presented in the epigastrium. The adventitious sac was treated by marsupialization; there was prolonged suppuration (four to five months) before the sinus finally closed. In July, 1912, there was evidence of recurrence; a large swelling in the epigastrium in connection with the liver reached to within 1 in. of the umbilicus, and a rounded swelling the size of a pigeon's egg protruded from the centre of the old scar. This swelling was cystic, and apparently in connection with the deep mass. At operation there were present in the old scar and immediately beneath it in the abdominal cavity two hydatid cysts in one sac. The contents of these cysts were clear crystal fluid about 15 oz. There were no daughter cysts. Between the left lobe of the liver, the stomach, and gastro-hepatic omentum was another cyst containing about 10 oz. of clear fluid. Both sacs were treated by aspiration of the fluid contents and the introduction of $\frac{1}{100}$ formalin solution for five minutes, removal of the hydatid memblane, washing out with saline, and suture. The lines of suture were brought up to the parietal peritoneum in closing the abdominal wound. Progress was uneventful, and patient has remained well since. The position of the hydatid cysts in this case—*i.e.*, in the track of the old sinus—seems to point to implantation of hydatid elements following the primary operation.

HYDATID OF THE BRAIN.

By T. F. Ryan, M.B., Ch.B.,

Surgeon, Nhill Hospital, Victoria.

I think that hydatid of the brain is of sufficient rarity in Australia and New Zealand to justify me in reporting the two following cases:—

K. X.

Patient was first seen in June, 1911, and at that time her age was six years and a half. There was a history of gradual loss of power in right arm and hand during the last three weeks. It appears that patient had been in the habit of laying her right arm on the floor while her companions wheeled a perambulator across her elbows. Some history of injury to clavicle.

Examination showed some weakness in the movements of right arm and hand. No wasting of muscles. Sensation, epicritic and protopathic, was not disturbed. Observation over several days revealed the fact that at times the right radial artery ceased to beat at the wrist, such periods continuing for several hours. The brachial artery could always be felt to pulsate normally.

A skiagram of the right shoulder and clavicular region showed nothing abnormal. Further examination of the nervous system elicited the fact that the tendon reflexes in the right arm were active and equal, with plantars of the flexor type. There was some tendency to incoordination in the arm-movements ; no disturbance of sensation anywhere in body. The fundus oculi was normal on each side, and there was a little indefinite mystagmus.

During 1912 the patient was seen on two or three occasions, when it was evident that the whole right side was becoming involved. The right arm showed some contraction of the flexors at elbow, wrist, and finger-joints ; the right leg exhibited weakness, mainly of the extensors, with a condition of paralytic equino-varus of the foot. The right side of the face was slightly paresed, and the tongue deviated to the right. Sensation in the various limbs remained normal. The tendon reflexes were exaggerated on right side with extensor plantar on the right. Finally, in December, 1912, the patient was readmitted, with the history that during the last four days weakness and disability had manifested themselves in the left arm and leg, and that speech had become difficult and hesitating. Examination now showed a right hemiplegia, affecting face, arm, and leg. The left arm presented slight weakness, with definite ataxia. All the tendon reflexes were extremely active, with tendency to patellar and ankle clonus on both sides. The superficial abdominal and epigrastric reflexes were absent, the plantars both extensor in type.

Sensation, of all varieties, was normal, except for a small patch of anaesthesia over right shin. Localization was deficient over right leg. No astereognosis observed. There was some hesitancy in speech. No affection of the word-seeing or word-hearing capacities. Pupils were equal, and reacted to light and convergence ; no nystagmus. There was double optic neuritis, slight in right eye, well marked in left (about 3 dioptres of swelling), the veins enlarged and arteries relatively small. The head looked large and massive compared with rest of body, and percussion showed a peculiar high tympanitic note, limited to the left fronto-parietal region.

Skiagrams of Head.—A skiagram of the head laterally showed thinning of the skull over the parietal region. A skiagram of the head in the antero-posterio diameter, with the face next to the plate, showed the outer circumference of the cyst and the thinning of the bone in the left fronto-parietal region. The X-ray exposure for both plates was 3 seconds.

Mental condition quite clear. At no time has there been any headache or vomiting.

Operation on 31st January, 1913 (first stage). Ether given after preliminary morphia, $\frac{1}{16}$ gr., and atropine. An osteo-plastic flap, $2\frac{1}{2}$ in. by $3\frac{1}{2}$ in., turned down over left Rolandic area. The skull in this region was extremely thin, in some places less than 2 mm. in thickness. The dura mater showed little tendency to bulge, and exhibited no pulsation. The dura was left intact, and the osteo-plastic flap replaced. The patient's condition after operation remained uneventful.

Operation on 5th February, 1913 (second stage). Under ether. On removing the bone-flap and incising the dura a large hydatid cyst presented, and was removed. Near the edges of the wound a greatly thinned layer of cerebral tissue was observed passing superficial to the cyst, but becoming obliterated over the convexity of the cyst. The latter occupied a large part of the left cerebral hemisphere, its greatest convexity being just in the region of the Rolandic area.

The bone section was not replaced, but the soft tissues were sutured, a small rubber drain leading from the cyst-cavity to the exterior. For a few days thin serous fluid drained through the tube, but the latter was left out on the sixth day, and the wound healed cleanly.

Condition after operation, 23rd April, 1913: Optic neuritis has completely disappeared, speech has improved, and is almost normal. There is still some contraction of flexors of right arm and some weakness of right leg with foot-drop, both being gradually overcome with splinting in the extended position.

Condition, January, 1914: Patient was seen about a week ago, nearly one year after operation. V. equals 6-6 both eyes, and the view of the fundus and disc in both eyes is normal. She can walk well, and can use her right arm very well.

N. M.

Male, aged forty-two, married, farmer. Previous history: Perfect health up to three months before I saw him in October, 1910. He was ploughing in a field three months before, when he fell to the ground. He was found soon afterwards by a brother, and was seen to be unconscious, but not convulsed. He was carried to his home, and in about fifteen minutes vomited and became conscious, and slept well that night. Next morning he resumed his occupation of ploughing, and remained well for six weeks. He then complained of a violent headache that continued till I saw him for the first time six weeks afterwards, in the evening, about 10 o'clock. His mental and physical condition was good, and he had no paralysis or abnormal reflexes. I examined his eyes, and found he had optic neuritis both eyes, and more marked in the left, a difference of about 2 dioptres. He slept well that night for about five hours, and then called out, and the nurse on going to see him found he was unconscious, breathing stertorously, and he died in about an hour.

At the post-mortem examination I found a hydatid about the size of an orange just showing through the cortex, and containing a thick sac. It was situated on the left side of the brain, about the area of the fissure of Rolando, and its lower circumference was resting just on the petrous portion of the temporal bone. There was an excess of cerebrospinal fluid, but no increase in the ventricles. There was no thinning of the bones over the site of the hydatid.

OPEN ETHYL CHLORIDE AND OPEN ETHER ADMINISTRATION.

By Dr. HORNABROOK.

MR. PRESIDENT and gentlemen,—As a teacher of the administration of anaesthetics, I wish to draw attention to some of the difficulties under present conditions. These difficulties are gradually disappearing as the scientific and practical importance of the work performed by the anaesthetist is learnt by the profession, but, as in the case of the reformer in "Milestones," his way is hard, and the old conservative methods are difficult to break through. What was good enough for our fathers is still good enough—or, rather, bad enough—for many in the profession to-day.

A remark was made a few years ago by a surgeon of fairly high local standing that a drayman could administer chloroform. What is to be regretted in a case of this sort is that, though the majority know how foolish and inaccurate such a statement is, the reputation of the surgeon is likely to mislead some of the younger men into thinking that anaesthetic work is mere child's play, with the result that if a fatality does occur, then it could not possibly have been any fault of theirs, but was due to some idiosyncracy of the patient.

The black list in the nature of deaths arising during operation or following on the faulty administration of anaesthetics is a very large one; it must total hundreds, if not thousands of cases, and it stands as a lasting memorial of which the profession cannot be proud.

Dealing with a period extending over some years, during the past five of which the number of cases of general anaesthesia which have come under my personal supervision has been from thirty to fifty a week, I am unable to recall one instance in which death has been narrowly averted in which there has not been an error of technique on the part of the anaesthetist or surgeon. The *British Medical Journal* so recently as September, 1913, in an editorial headed "Manslaughter by Anaesthesia," referring to cases in which deaths have arisen in the hands of untrained and unqualified persons who administer powerful anaesthetic drugs, remarks as follows: "But if death is caused by gross incompetence in handling dangerous drugs, neither does public opinion appear to take any serious interest, nor do the administrators of the law show themselves disposed to mark the gravity of the offence against the public welfare by any adequate penalty. The particular set of men who constitute the Coroner's jury are shocked, and adopt a rider, but the public keeps on taking no notice. We would like to see a charge of manslaughter made in such cases. But it would be very much more statesmanlike to prevent these catastrophies."

Now, gentlemen, if we are going to deal in the above manner with the uneducated and untrained man, what is going to be our attitude towards the duly qualified medical man, be he anaesthetist or surgeon, who ought to know better and yet neglects to take warning when the numerous dangers and intricate happenings which may arise in almost any case of anaesthesia are pointed out to him by men who have constant practice in the teaching and administration of anaesthetics?

Personally, I think the term "manslaughter" is a mild one. One of the greatest difficulties the teacher has to contend with is the inborn idea that any fool can administer an anaesthetic, and that all the anaesthetist has to do is to render the patient unconscious to pain and to keep him in that state, the amount or nature of the anaesthetic required to do so being immaterial.

Anaesthetists know to-day that the drugs they handle are poisons, and very powerful ones, and that it is not necessary for a death to occur actually on the operating-table or in an adjoining room for death to be accelerated by the maladministration of an anaesthetic, or for convalescence to be even seriously retarded by bad administration.

The duties of the anaesthetist are heavy and exacting. To recognize these he must receive proper training whilst a student, in the same way as the physician or surgeon, and by men who make a special study of this branch of their profession. To obtain these men every encouragement must be given by the medical schools and hospitals to the anaesthetist.

The anaesthetist should be placed on the staffs of the hospitals to which they are attached on an equal footing with other members of the staff. It is useless to expect good men to come forward unless they are given some status. The work of the anaesthetist certainly entitles him to that.

I am pleased to say that this is being recognized more and more every day; and in Victoria, in the case of the St. Vincent's Hospital, the Alfred Hospital, the Melbourne Hospital, and the Women's Hospital, the anaesthetists are now on the honorary staff on an equal footing with other members of the honorary staff. All the above hospitals are medical schools recognized by the University of Melbourne for the training of medical students.

The great drawback in the past has been the failure to recognize the full value of the work done by the anaesthetist, and the failure to recognize, on the part of the surgeon or administrator, how important it is that the anaesthetist should have a wider knowledge than the mere ability to render the patient unconscious to pain.

A few years ago I was stopped one morning on my way from hospital, and asked by a surgeon if I was not busy on the following day could I come up to a certain private hospital and be present whilst he did a big abdominal operation. The patient was a lady who had been sent to him by A., a suburban practitioner; A. had sent him a case before, and on that occasion he had asked him to assist at the operation; that he had found A. such a fool at assisting that he had this time asked him to give the anaesthetic, and that he was uncertain as to his capabilities as an anaesthetist; and that as the case was a serious one would I mind coming up to the hospital if I could the following morning. For the next few minutes the air was electric, as I had no hesitation in telling the surgeon what I thought of his conduct in placing the life of a patient in the hands of a man whom he considered too much of a fool to assist him. In handing the anaesthetic over to A. he had placed him in a far more *responsible* position than that of assistant.

An anaesthetist requires to act with judgment, quickness, and coolness. He must be capable of recognizing the least sign of danger, know to what cause those danger-signs are due, and be capable of taking steps to remedy them without disturbing the operator unnecessarily.

An anaesthetist, to be successful, must be so up in his work that the surgeon ought not to know that he has an anaesthetist. In other words, the surgeon should feel that he has the utmost confidence in the judgment and ability of the anaesthetist, and so can devote his full attention to the operation.

In many operations, and in the handling of toxic cases, the anaesthetist is very often in a more difficult and dangerous situation than the surgeon, and it is only right that his position should be adequately recognized. I am sorry to say that some surgeons, instead of helping the administrator in a difficult and dangerous case, hamper him by the expressions or looks of annoyance when things do not go exactly as they wish.

In the case of an inexperienced anaesthetist this implied censure may very easily bring about the death of the patient. No anaesthetist likes to find himself in difficulties, any more than the surgeon does. It is quite as annoying for him to find things not going as well as he would wish as it is for the surgeon. In an ordinary straightforward case a patient can be placed in a state of surgical anaesthesia in from three to five minutes; there are, however, other cases—especially big plethoric patients, or cases in which there is a toxic condition of the blood, as in any septic patient—in which it may take the anaesthetist ten to fifteen minutes to obtain surgical anaesthesia, and even then it may not be a satisfactory one.

In septic cases there is already a toxic condition of the blood, and the anaesthetic is not so readily taken up; and in his endeavours to hurry things up the anaesthetist is apt to rush the anaesthetic, and, maybe, push the chloroform to such an extent that there is a sudden breaking-down of the barrier, and the patient collapses and dies with a suddenness that is almost beyond comprehension, or, if he does not die, there is complete cessation of respiration and a cardiac failure that causes many minutes' grave anxiety to all concerned.

The experienced anaesthetist knows he has to be specially careful in these cases, and has to carry on his anaesthesia steadily and surely, watching for signs of trouble very closely; but the man of less experience, seeing his patient with well-marked corneal and lid reflex, is apt to go pushing things, thinking that he has plenty to spare, and the next thing he knows is that his patient has fallen over the precipice; and the fact that he may get him out of the operating-room, to die possibly in a few minutes, is no excuse for his bad workmanship, even if post-mortem appearances do reveal cardiac weakness.

The man who handles his anaesthetic work properly is always ready to give an anaesthetic to a cardiac case. He knows that if he handles his drugs properly there is practically no more strain thrown on the heart than under normal conditions; and this is where the proper use of the *small* preliminary dose of morphia and atropine, and the almost complete abandonment of chloroform as an anaesthetic *per se*, has been a Godsend, and has helped to save hundreds of lives.

To illustrate the difficulties that the anaesthetist may meet with, and the want of sympathy that he may experience at the hand of the surgeon, the following is an example: Leaving the Melbourne Hospital one morning, I was recalled by a Resident, and asked if I would give an anaesthetic for an immediate appendix case. I replied that I would not give the anaesthetic, as it would be better for him to give it, but that I would stand by him whilst he was at work. The patient was a female of about forty years, and had been given $\frac{1}{8}$ gr. morphia and

$\frac{1}{150}$ gr. atropine about half an hour before the anaesthetic was commenced. The anaesthetist started with open ethyl chloride, followed by open ether; he had a tendency to rush his ether, a very common fault, and in a case of the above stamp not a good one, as the concentrated ether vapour is apt to bring on a laryngeal spasm. This means congestion, congestion means swelling of the parts and more obstruction, which means asphyxiation, and asphyxiation means *rigidity*.

An asphyxiated patient means a *rigid* patient; this fact can be very easily demonstrated with any patient by means of nitrous oxide, or closed somnoform, or concentrated ethyl chloride, or ether vapour. The same patient can be nicely relaxed by means of nitron oxide and oxygen or semi-open somnoform or open ethyl chloride, and be in a less deep stage of surgical anaesthesia than he would be by the closed method. For a surgeon to say that a patient is not under because he is rigid is one of the gravest errors he can make; the rigidity may be, and very often is, due not to too little anaesthetic vapour, but to *too much*, or, in other words, asphyxiation by concentration of the anaesthetic.

In the above patient she very soon showed signs of laryngeal obstruction and congestion, and it was very evident that the abdominal walls were not relaxed. This was partly due to the patient's complaint—an acute appendicitis, with the accompanying abdominal rigidity over the area of the inflammation, and the rigidity or tone in the muscular wall is not always completely removed even under deep anaesthesia. This remark applies to all acute inflammation of the abdomen. The anaesthetist was advised to slacken off with his ether and to change to chloroform, with the idea of obtaining a surgical anaesthesia by means of an anaesthetic that allowed more air to be used and was less irritating to the larynx. In spite, however, of the chloroform, the rigidity remained, and it was very evident that there was some abnormality in the air-passages. On examining the patient's throat a large scar about 2 in. in length, and from ¾ in. to ¼ in. in breadth, was seen diagonally across the skin over the larynx. No note had been made of this condition, and, as the patient was then deeply under the anaesthetic, no history was then obtainable.

Seeing the surgeon's very evident annoyance at the persistency of the abdominal rigidity, and fearing that the anaesthetist, in his futile efforts to obtain complete relaxation, might push the chloroform so that a dangerous concentration of the drug might be used, with sudden respiratory failure and a fatality, I took over the anaesthetic myself, but obtained no better result, nor did I expect to, in view of the condition existing.

The operation was completed under difficulties, the anaesthetist and surgeon being at strained relations owing to an abnormal condition for which the surgeon had no appreciation, and therefore showed no sympathy for the anaesthetist in his difficulties. A fatality might very easily have occurred in this case, for which the anaesthetist would have had to stand the inquiry, and in which the conduct of the surgeon would have been very largely to blame.

I have no doubt the usual verdict, "that the anaesthetic was necessary and was administered without negligence," would have been returned. This means legal criminal negligence, the sole verdict possible, short of manslaughter. This, however, would have been poor consolation to those nearly related to the patient. On inquiry of the patient the day following the operation, I found that when a child she had a very severe burn of the skin over the larynx, and this burn had taken several months to heal properly. This would account for the scar and the contraction of the larynx with obstruction of the air-way and consequent difficulty in administering the anaesthetic, and failure to obtain a satisfactory relaxation of the abdominal walls. But, with all this, there would have been no excuse for a fatality under the anaesthetic and faulty administration.

The actual statistics as to death under anaesthetics are quite valueless, for we have no means of obtaining any account of those fatalities that arise from faulty administration, and do not actually occur during operation or during the administration of the anaesthetic.

The progress of anaesthetic work has been greatly retarded by the freedom with which even difficult cases are handed over to men of not very profound experience, and the willingness of the profession to shield itself, when a fatality does occur, under the plea that there was something abnormal about the patient or the anaesthetic, instead of learning to combat that abnormality, and listening to men who have devoted a large proportion of their lives to endeavouring to improve the very unsatisfactory condition at present existing. For some time past I have been persistently advising anaesthetists to keep to the small doses of morphia and altropine as a preliminary to open-ether work.

This advice was not given for nothing, but was the result of close study of hundreds of cases extending over four years and under various conditions in the Melbourne Hospital, the Women's Hospital, the Eye and Ear Hospital, and in private work. The work was first started with $\frac{1}{6}$ gr. morphia and $\frac{1}{120}$ gr. atropine, given from half an hour to one hour before operation. It was then found that, though this dose suited a large number of cases, there were others, especially anaemic females, who showed signs of respiratory depression, not actually on the operating-table, but from half an hour to an hour, and in some cases even longer, after the patient had been removed from the operating-table in apparently excellent condition.

These cases caused me to reduce the dose to $\frac{1}{8}$ gr. morphia and $\frac{1}{150}$ gr. atropine, given from three-quarters of an hour to an hour before commencing the anaesthetic. This was with the view of commencing the anaesthetic during the sedative stage of the morphia; morphia being firstly a stimulant, especially in small doses, secondly a sedative, and thirdly a respiratory depressant, so that by using the smaller dose there would be less likelihood of the morphia reaching the depressant stage. The atropine was also reduced, as it was found that in a few cases the $\frac{1}{150}$ gr. caused the tongue to become too dry, and that the tongue then showed a tendency to swell and obstruct the air-way. Moreover, with the mouth too dry, the anaesthetic is not taken so easily.

Having used the $\frac{1}{8}$ gr. morphia and $\frac{1}{150}$ gr. atropine with very satisfactory results, I then endeavoured to reduce it still further, and started $\frac{1}{12}$ gr. morphia and $\frac{1}{200}$ gr. atropine; and, though this gave very satisfactory results in a number of cases, it was not so uniform as the $\frac{1}{8}$ gr. morphia and $\frac{1}{150}$ gr. atropine; and, moreover, there was a tendency for a little too much moisture in the air-passages, a result nearly as bad as a too dry tongue. So we returned to $\frac{1}{8}$ gr. morphia and $\frac{1}{150}$ gr. atropine, and this is used as a routine practice in the Women's Hospital, the Eye and Ear Hospital, and in the majority of cases at the Melbourne Hospital. The above is my *maximum* dose for all cases over twelve years of age, male or female. I find this quite enough for any case if given at the right time—viz., three-quarters of an hour to one hour before operation.

N.B.—In one case, a middle-aged female, the amount of ether used was only $6\frac{3}{4}$ oz. in two hours and a half, $3\frac{3}{4}$ oz. being used in the first hour. In another female case, a young girl, examination and removal of appendix, only $2\frac{1}{2}$ oz. of ether was used in one hour. In all cases *open* method of ether is used. Head gently raised and eyes closely bandaged.

This preliminary of morphia and atropine makes the giving of the anaesthetic far easier for the anaesthetist; it relieves all fear on the part of the patient, a most important point; and undoubtedly lessens the tendency to shock even in the severest operations; and certainly reduces the quantity of anaesthetic consumed, another important point, as it reduces the tendency to acidosis and post-operative vomiting. Post-operative vomiting has to-day become almost a thing of the past, certainly as a persistent event. In using morphia and atropine the anaesthetist *must not use chloroform* as an anaesthetic *per se;* if he is so foolish as to do so, then he is certain to have a fatality sooner or later, not actually on the table, but very likely arising an hour or more after the operation has been completed, and the patient will die of respiratory failure. If he does not have a fatality, then he will have something very near to it, and considerable anxiety. Both morphia and chloroform are respiratory depressants, and the man who persists in the use of this combination is doing a very serious wrong; and if a fatality occurs he renders himself liable to grave censure, even if the excuse is found for him at the post-mortem of the abnormal condition of the patient.

I had two fatal cases brought under my notice within the past twelve months, where, in spite of the warning given above, the anaesthetist had used $\frac{1}{6}$ gr. morphia and $\frac{1}{120}$ gr. atropine, and chloroform as the anaesthetic. Both cases were private ones, and females, and I have no hesitation in saying that their deaths were hastened by the methods used; nor do I believe that either death would have occurred if the small dose of morphia and atropine had been employed, and open ether used as the anaesthetic. Both fatalities occurred after the patient had been removed from the operating-table.

Within the past ten days—this is middle December, 1913—I have had two cases reported to me. In neither case did a fatality actually occur, but both caused considerable anxiety; and again instructions were not followed out, but $\frac{1}{6}$ gr. morphia used and chloroform employed as the anaesthetic. The mere fact that a man may have a large number of apparently successful cases with $\frac{1}{6}$ gr. morphia and $\frac{1}{120}$ gr. atropine does not excuse him from using a smaller and safer dose, and I certainly think quite as effective, if given from three-quarters of an hour to one hour before operation.

In cases of severe shock it is a distinct gain to give the patient $\frac{1}{8}$ gr. morphia and $\frac{1}{150}$ gr. atropine about ten minutes before starting the operation. This is done to get the benefit of the *stimulating* stage of the morphia, and open ether should be employed as the anaesthetic.

I use morphia and atropine for all my cases except short dental ones and post-nasal and tonsillotomy operations. In the operation of enucleation of the tonsils, morphia and atropine given about an hour beforehand is of distinct advantage. The only exception to the use of morphia and atropine for operations of any duration is in those head cases in which there is any question of the respiratory centre being out of gear, or the base of the brain involved ; in these cases morphia must be avoided at all cost, though a small dose of atropine may be given with advantage. The doses are as follows : Morphia $\frac{1}{8}$ gr. and atropine $\frac{1}{150}$ gr. for all patients over twelve years of age and up to any age. Morphia $\frac{1}{12}$ gr. and atropine $\frac{1}{150}$ gr. for eight to twelve years; morphia $\frac{1}{20}$ gr. and atropine $\frac{1}{200}$ gr. for three and a half to eight years : and it is advisable to use the *tablets*, and not the made-up solution.

I have used morphia and atropine for a patient as young as fifteen months, but I do not advise it, as I have not yet had enough experience to speak with any certainty in cases below three years and a half. Of course, open ether is the anaesthetic used, and not chloroform, even in children.

The anaesthetist to-day takes other means to lessen the consumption of anaesthetic by the patient. With the head and shoulders slightly raised at a natural angle from the commencement of induction, and if possible throughout the operation, he finds he requires less anaesthetic, and has, moreover, something to fall back upon should any trouble arise. Immediate lowering of the head will cause a rush of blood to the brain, with stimulation of the cardiac and respiratory centre without the necessity to have to resort to artificial respiration.

When a patient is once surgically anaesthetized the complete shutting-off of all light from the eyes by means of a thick towel or bandage makes it very much easier for the anaesthetist to maintain a successful anaesthesia, and with a smaller consumption of anaesthetic and less tendency to irritation of the air-passages, and also less tendency to post-operative vomiting. In the majority of instances the patient under operation lies with his face turned directly towards a bright light, and we all know how disturbing that is from our own experience of an early summer morning ; and one has only to place one's hand over his own eyes when looking towards a bright light to feel the soothing effect even when the lids are tight-closed.

Personally I never see more of my patient's face than the lobule of one ear. Attention is directed to this and respiration ; the lobule of the ear shows trouble, whether cardiac or respiratory, at once, if any arise.

The whole object of the anaesthetist to-day is to obtain a successful surgical anaesthesia, using as little of his poisonous drugs as possible, and not seeing how much the patient will stand without killing him. By this means he helps considerably towards a successful convalescence, and should receive the thanks of the surgeon and patient ; instead of which we so often see that if anything goes wrong it is said to be due to faulty administration of the anaesthetic.

There is one more word of warning, and that an important one : How many surgeons even think of informing their anaesthetist when they are going to use adrenalin, or even think of asking if they may do so ? And yet the surgeon who does not do so is acting wrongly. For all he knows the anaesthetist may be using chloroform as his anaesthetic, and chloroform with adrenalin is a very dangerous combination, possibly due to the weakened action of the heart from the chloroform and the contraction of the arterioles from the adrenalin causing an obstacle that the heart in its embarrassed condition cannot overcome, and a fatality occurs. I would especially warn against plugging the nostrils with adrenalin and cocaine, and then following with chloroform as a general anaesthetic. Adrenalin can, however, be used with ether.

Again, do not use $\frac{1}{4}$ gr. or even $\frac{1}{6}$ gr. morphia suppository immediately on the termination of an operation if the patient has had any preliminary injection of morphia and atropine before operation, for the reason that you may find it is quite unnecessary ; and a more important reason is that you are adding a respiratory depressant which may lead to the necessity for artificial respiration after the patient has been removed to his room. It is far better and wiser to wait and give the suppository about five hours after the operation, when the danger is over. In a number of cases of haemorrhoids which have been under observation it has been found, however, that the morphia suppository can very often be done away with.

I would also ask surgeons to be as gentle as possible when dealing with the abdominal contents ; nothing upsets the smoothness of an anaesthesia so much as the roughness with which some men pull on the abdominal organs and drag on adhesions when making an abdominal examination. I know they do not think they are rough, but there is a marked difference in the manner with which some men handle things. In cases of intestinal obstruction, which are always very difficult and dangerous from an anaesthetic point, I would ask surgeons, whenever possible, to empty the intestinal contents by means of making an incision into the bowel and inserting a fair-size drainage-tube, and so get the intestines as collapsed as possible before replacing them. There is surely more chance of a paralysed bowel recovering tone if it is completely emptied than if still partly distended ; from the anaesthetist's point of view there are other reasons. Even when the patient is deeply anaesthetized in these cases there is generally some abdominal rigidity, and, in spite of the surgeon's efforts to return the bowel, those portions containing any gas will always have a tendency to bulge outwards, and this without any straining effort on the part of the patient. The kneading movements the surgeon makes in pushing the intestine back into the abdominal cavity only succeed in driving some of the stercoraceous contents upwards out of the stomach, and without a second's warning there is apt to be an outpouring through the mouth like the outbreak of a geyser.

In ordinary cases when the patient is going to vomit under an anaesthetic he gives ample warning, in that the anaesthetist, if watching closely, will see a swallowing movement once or twice before the patient vomits, and he can control matters by deepening the anaesthesia ; but with stercoraceous vomiting the position is quite different : there is no warning, and if the anaesthetist has his patient pushed to the profoundest stages of anaesthesia this sudden outpouring may mean the death of the patient, in that he may be drowned by the fluid from his own stomach. For this reason the anaesthetist has to retain just the slightest trace of tone, so that he will be able to get his patient round before it is too late, and prevent the fluid entering the lungs.

I am not in favour of the operation for extirpation of the thyroid being done under local anaesthesia ; it is not because these goitre cases cannot be done by this method, and very successfully, but because we have no right to inflict unnecessary suffering, not merely at the time of the operation, but subsequently. These goitre cases are almost invariably of a very nervous temperament, and, with the preliminary small dose of morphia and atropine, can be operated upon under open ether equally as well as under a local anaesthetic, and with the additional great advantage that the patient does not know what is going on. Her operation does not then become to her a nightmare, which may cause many a restless night for even years after the operation.

I have had more than one instance of this brought under my notice within the past few years. Mental distress is apt to be more lasting and depressing than physical pain, and it is not right that we should inflict unnecessary mental distress on any patient ; and I certainly think we run a very great risk of doing so when we resort to local anaesthesia as a means in these goitre cases.

Hewitt concludes his latest edition on " Anaesthetics and their Administration " with these words : " All the leading professional bodies have expressed approval of this attempt to reduce those terrible and regrettable fatalities which seem to constitute a standing reproach to a scientific profession."

De Ford, one of the leading American anaesthetists, very truly says, " I am satisfied that it is not the anaesthetic that is primarily responsible for accidents during anaesthesia when the accident is traced to the anaesthetic, but it is the fault of the anaesthetist, who has not properly administered the anaesthetic. Inexperience, ignorance, and carelessness on the part of the anaesthetist are responsible for more deaths than the action of all anaesthetics combined. It is of paramount importance to know anaesthetic symptoms. Ignorance in these matters has resulted in sending thousands of patients to unnecessary graves."

I think, gentlemen, it behoves us as medical men to assist in every way the efforts of the anaesthetist to attain these ends, and our first step in this direction must be giving the anaesthetist the status his work justly entitles him to, and placing him on an equal footing with other members of the hospital staff with whom he works.

The aim of the anaesthetist is to obtain greater reciprocity between the surgeon and the anaesthetist than exists in some cases to-day—a reciprocity that will mean better and easier work for the surgeon and the anaesthetist, with beneficial results to the patient.

It is not the duty of the anaesthetist to add anaesthetic shock to surgical shock by overdosage. It is the duty of the anaesthetist to point out to the surgeon that there are means of lessening the mortality both during operation and in the few days following operation.

Such reduction in mortality rests not entirely with the anaesthetist and his method of administration, but also greatly depends on the handling of the patient by the surgeon when under the influence of the anaesthetic.

I am afraid some surgeons think that when a patient is once under the anaesthetic it matters very little how they handle the patient ; they give the impression to the onlooker of working on an " anatomical specimen " rather than a sensitive human being. They use their hands with an absence of delicacy that they would not do if the patient was not under anaesthesia.

A patient requires to be handled with just as great care and delicacy when under an anaesthetic as when he is not. Rough handling requires a deeper stage of anaesthesia than is necessary in the case of a surgeon who uses his hands well. Gentle handling means less poisoning for the patient and less risk of post-operative vomiting, and a more favourable convalescence.

The object of the modern anaesthetist is to obtain a satisfactory surgical anaesthesia without the consumption of an unnecessary quantity of the poison by the patient.

If surgeons would warn their anaesthetists when they are going to make any move out of the ordinary it would be a distinct gain for the surgeon, the patient, and the anaesthetist. I have known a surgeon, without a word of warning to his anaesthetist, at the completion of an operation for the removal of the appendix, suddenly plunge his hand into the abdominal cavity and commence a general feel round. The anaesthetist has very possibly been holding his patient in check with the consumption of a minimum amount of anaesthetic. If he had known only a minute or two beforehand he could have deepened the anaesthesia whilst this operation was going on. Absence of this warning has very possibly upset the even running of the anaesthesia, and caused the patient to strain and the surgeon to think, if not to say, uncomplimentary things. All trouble could have been avoided by a friendly word of warning. With the aid of a preliminary small dose of morphia and atropine we are able to-day to obtain a lighter stage of surgical anaesthesia, without the risk of reflex shock to the patient. But co-operation of the surgeon is necessary so that we may obtain the best possible results. In giving us that assistance the surgeon will gain, and above all the patient will be more favourably placed for a rapid convalescence.

The modern anaesthetic methods demand greater skill in administration and care in watching, and when these are attained the results will be worth all the trouble taken—in the lessened risk of a fatality occurring either during operation or shortly afterwards.

The anaesthetist should not be on the look-out to find excuses for himself when a fatality occurs during or shortly following anaesthesia, in abnormalities possessed by the patient. Granted these abnormalities, he is on the look-out for improvement in his methods and those of the surgeon, so that the mortality during or shortly following operations may be lessened.

APPENDIX.

As I am so often asked about the amount of anaesthetic I use, the following notes may be of benefit :—

Case 1.—Female, aged thirty-six years. First hour—Ethyl chloride, 8 c.c. ; chloroform, ½ dr. ; ether, 3¾ oz. Second hour—Ether, 2¾ oz. ; no chloroform. Last half-hour—Ether, ¼ oz. Total ether, 6¾ oz. ; $CHCl_3$, ½ dr. ; ethyl chloride, 8 c.c. Duration of operation, two hours and a half. Operation consisted of dilating cervix, currettage, resection of cervix, repairing of perineum, and removal of haemorrhoids. Patient removed from operating-table in excellent condition. No morphia suppository given or required after operation. Eyes bandaged, head and shoulders slightly raised, throughout operation.

Case 2.—Female, aged about twenty-seven years. Duration of operation, one hour. Ethyl chloride, 8 c.c. ; chloroform, ½ dr. ; ether, 2½ oz. Operation : Removal of appendix, and abdominal examination.

Patient removed from operating-table in excellent condition. Anaesthesia deep whilst surgeon making incisions and during abdominal examination. During actual removal of appendix, after surgeon had drawn appendix forward to opening in abdominal wall, anaesthesia slackened off, and patient kept in stage of deep sleep. Head and shoulders slightly raised and eyes well bandaged.

Case 3.—Male, aged forty-nine years. Operation : Clearing of both triangles of neck thoroughly, and resection of growth from lower lip. Duration of operation, three hours. Anaesthetic commenced, 9.15 a.m. ; operation completed, 12.20 p.m. As in all other cases, ½ gr. M. and $\frac{1}{150}$ gr. atropine one hour before operation. First hour—Ethyl chloride, 8 c.c. ; chloroform, 1 dr. ; ether, 3½ oz. Second hour—Chloroform, ¾ dr. ; ether, 2¼ oz. Third hour—Ether, 1 oz. ; no chloroform. Total ether in three hours, 6¾ oz. ; $CHCl_3$, 1¾ dr. No anaesthetic used at all during the last twenty-five minutes of operation. At end of operation patient just coming round from anaesthetic, and could open or shut mouth when told to, or open or shut his eyes, but felt not the slightest pain from inserting the stitches into the lip.

Pulse : Before operation, 76, good and regular ; end first hour, 72, good and regular ; end second hour, 72, good and regular ; end third hour, 76, good and regular.

No post-operative vomiting. Patient was sitting propped up in bed, quite conscious, about twenty minutes after return from operating-theatre.

Temperature : Just before operation, 97·6° ; on return from theatre, 97° ; 4 p.m. (three hours and a half after return from theatre), 98°. Patient's temperature rose to 99·2 and pulse to 80 on the second morning following operation, but was back to 98·4 same evening and pulse to 72. Respiration varied between 18–20 per minute, being 20 on admission into hospital two days before operation.

Patient was up out of bed on second day following operation. On being questioned second day after operation, patient said that he knew nothing about opening and closing mouth and eyes when he was told to do so, nor did he have the slighest sensation of pain when the stitches were inserted into the lip. Patient at no time showed any signs of collapse, though he looked a little blue once whilst some blood was impeding his air-way. Had drink of water at 3.30 p.m., and milk and water during the evening. Complained of soreness when swallowing evening of and day following operation. Pulse was 80, good and regular, 3.30 p.m. day of operation. Respiration quiet and easy throughout operation, and no sign of any lung-irritation after operation. The method of anaesthesia used, as in all other cases, is open ethyl chloride followed by open ether on the Murrays mask of *one* layer of flannel only. Head and shoulders slightly raised throughout operation and eyes well shut off from all light by means of thick soft towel or bandages.

By this method the anaesthetist ought to be able to handle any ordinary case with from 3¼ oz. to 5 oz. ether in first hour, ½ dr. to 1 dr. chloroform, 8–10 c.c. ethyl chloride (open).

In giving the above notes I would remind anaesthetists and surgeons that the quantities of anaesthetic used in a definite time not only depend largely on the patient and the nature of the case, but also on the *climate.* I find a nice dry atmosphere the best to work in. In saturated atmospheres and on very cold days more anaesthetic is used, though this does not mean more anaesthetic is necessarily inhaled by the patient. The majority of men when learning the open method undoubtedly use far too much anaesthetic, and as they become more expert find they can get along with far less with even better results. I consider the atropine not only an advantage in controlling the vagus, but also has a distinct tendency to lessen the possibility of lung-irritation by the ether vapour, and controls any tendency there may be to broncho-pneumonia. I have had only three cases in which there has been irritation of the lungs after this open method. One an Australian aboriginal who ran a temperature for two or three days with a cough, another was a Hindoo who had a slight cough at the time of operation, and the third a lady who had only recovered from an attack of bronchitis about a week before operation. In none of these cases was there any serious trouble, and temperatures were down again within three or four days. Less ether is used in those cases which have the preliminary M. and A. than in those cases which do not have it. In all my cases the patient is always placed in bed after operation, with the head naturally comfortable on a soft pillow, and not flat in bed. I object thoroughly to a patient being carried from the operating-theatre either downstairs head first or upstairs feet foremost. I consider this position, so often adopted, of carrying the head low has a tendency to make the patient feel sick and vomit. This was noticed in the old Melbourne Hospital, in which there were no lifts. It was noticed that patients in the upstairs wards showed more tendency to post-operative vomiting than those in the downstairs wards, which were on the same level as the theatre. Both sets of patients received the same anaesthetic methods. It was then noticed that the wardsmen in carrying the patients upstairs, after operation, carried them feet foremost. Instructions were then given to stop this, with marked improvement.

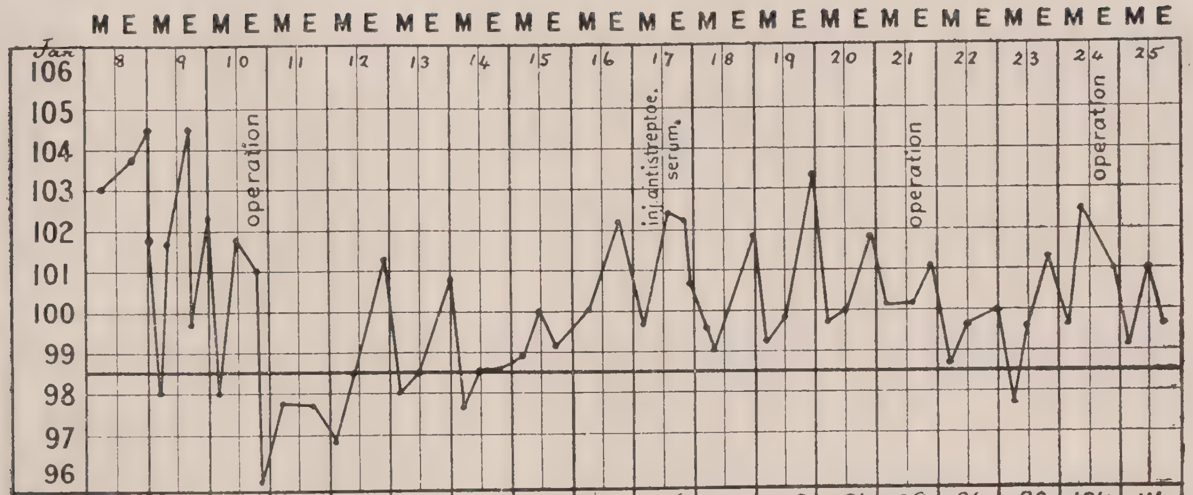
Patients should be operated upon on the same table as on which they are anaesthetized; the mere shifting of a patient from the stretcher on to the operating-table may upset the even course of an anaesthetic, and cause the patient to reach and vomit, and so lead to trouble for the anaesthetist and surgeon throughout the operation.

Melbourne Dental Hospital, Australia, 1st July to 30th June.

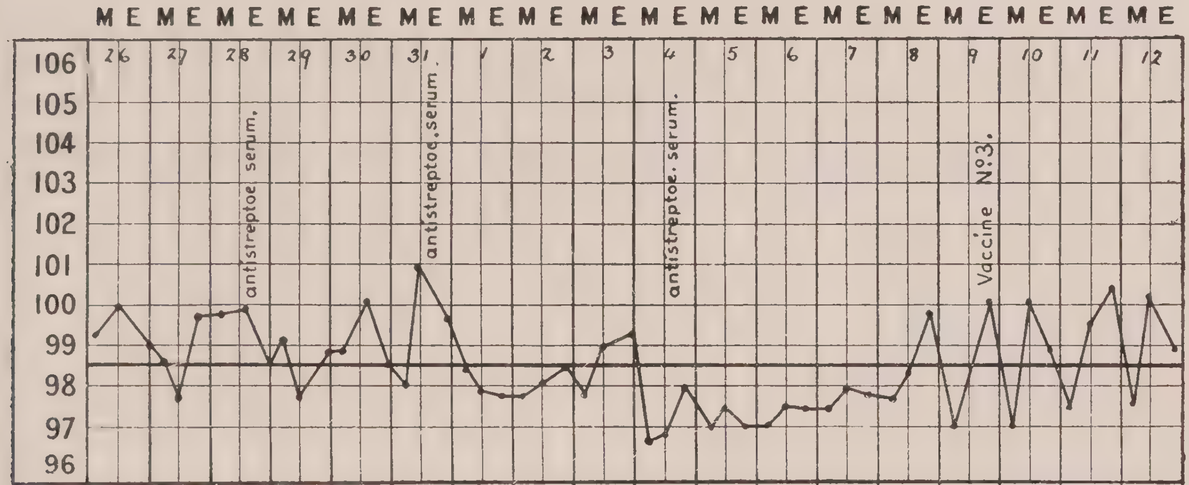
—	1906–7.	1907–8.	1908–9.	1909–10.	1910–11.	1911–12.	1912–13.	Half-year to End 1913.	Total in Seven Years and a Half.
Nitrous oxide	586	612	30	241	79	57	17	..	1,622
Nitrous oxide and ethyl chloride ..	41	350	1,046	1,655	504	165	7	..	3,778
Ethyl chloride	136	802	785	216	665	1,500	1,107	338	5,549
Somnoform	2,328	1,183	819	552	1,351	1,114	1,003	852	9,202
Ethyl chloride, $CHCl_3$, and ether ..	..	..	..	..	..	..	4	22	26
Ethyl chloride and ether ..	10	..	..	..	..	..	1	37	48
Ethyl chloride and somnoform ..	..	..	..	1	..	..	9	..	10
Nitrous oxide and oxygen ..	138	..	..	..	..	..	..	..	138
Chloroform	11	..	..	..	..	..	..	..	11
Ethyl chloride and oxygen ..	..	56	125	16	..	..	..	..	197
Nitrous oxide and somnoform ..	..	..	3	..	..	..	..	..	3
									20,584

Out of 20,584 cases, ethyl chloride or somnoform was used alone or in conjunction with other anaesthetics in 18,813.

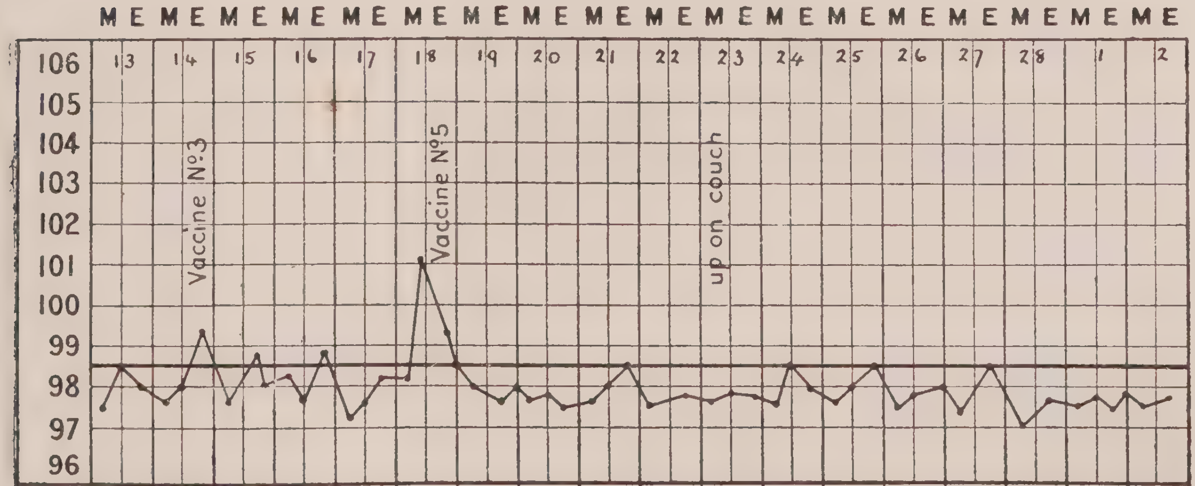
In *all* cases the anaesthetic is given in the *upright* or *semi-upright position*.



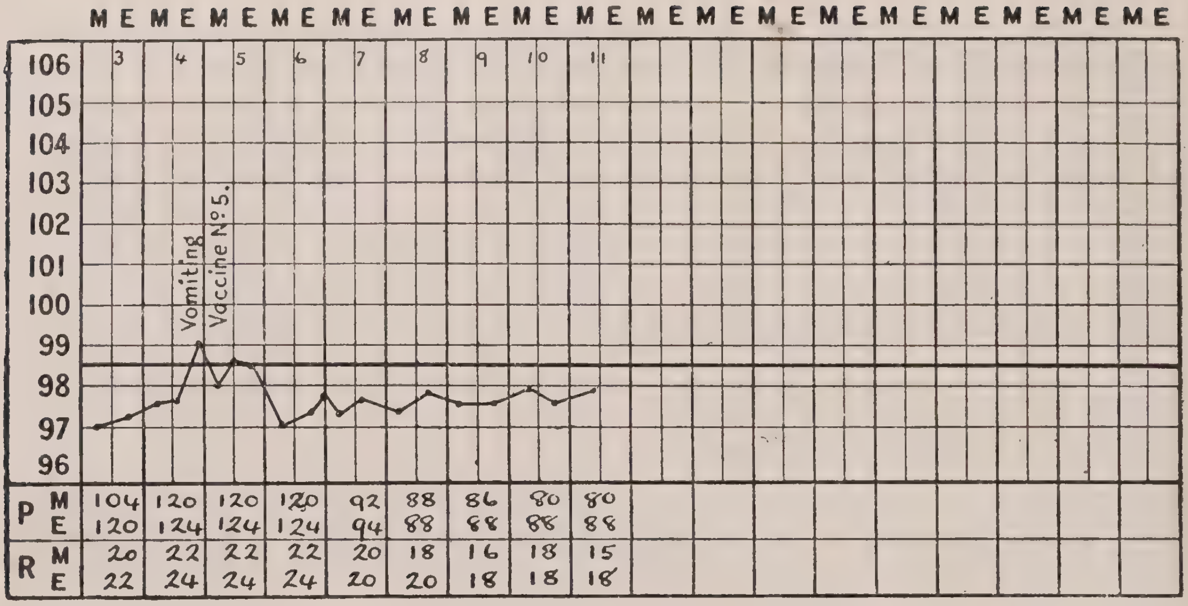
		8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
P	M E	148 148	118 144 128	120 132 120	132 114	100 120	100 124 114	104 104 104	104 102 115	100 118 104	108 104 106	114 104 108	102 116	96 108 108	98 108 120	96 94 98	92 108	104 120 124	116 116 118
R	M E	30 28	24 28	24 24	22 20	24 26 26	20 20 30	20 22 22	24 20	20 20	26 20	26 20	24 26	18 20	20 20	18 20	18 20	22 22	20 24



		26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12
P	M E	110 104	108 112	114 116 112	108 116	120 120	108 124	120 120	118 120	112 126	110 124	110 114	104 112	120 120	120 120	120 124	112 124	124 128	118 124
R	M E	28 24	24 24	20 20	18 20	22 24	20 26	22 26	20 24	20 20	20 24	24 24	24 24	20 24	20 24	22 21	20 22	20 22	20 22



		13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	1	2
P	M E	114 124	116 120	114 128	120 128	120 128	120 128	110 112	110 120	118 120	104 110	108 124	112 128	110 128	110 124	108 114	108 108	112 120	100 104
R	M E	20 22	20 20	20 22	20 20	20 24	20 22	20 24	20 22	20 20	20 20	20 20	20 24	24 24	20 24	20 22	20 24	20 24	20 22



In no case has there been a death nor has there been any serious collapse. No closed method of anaesthesia is used, but either open or semi-open, the idea of the anaesthetist being to push his patient gently into an anaesthetic state, and not to knock him into it. The closed method of ethyl chloride is looked upon as dangerous.

During the past eighteen months—that is, up to end of December, 1913—the anaesthetics used have been :—

Nitrous oxide	17
Nitrous oxide and ethyl chloride	7
Ethyl chloride	1,445
Somnoform	1,855
Ethyl cloride, $CHCl_3$, and ether	26
Ethyl chloride and ether	38
Ethyl chloride and somnoform	9
Nitrous oxide and oxygen	..
Chloroform	..
Ethyl chloride and oxygen	..
Nitrous oxide and somnoform*	..

* Out of 3,397, ethyl chloride or somnoform was used alone or with other anaesthetics in 3,380 cases.

Melbourne Hospital.

Ethyl chloride used, in cubic centimetres :—

	C.c.
1908	840
1909	20,520
1910	9,900
1911	31,180
1912	64,780
1913	71,760
1914 contract	216,000*

* 2,160 tubes of 100 c.c.

Contract for 1914, Melbourne Hospitals : 22 gross of 100 c.c. tubes equals 3,168 100 c.c. tubes, or 316,800 c.c. of ethyl chloride.

Ethyl chloride is used alone, by the open method, in tonsillotomy and adenoid cases. In all other cases it is used as a preliminary to open ether, about 8–10 c.c. being used in each case as a general rule.

Ethyl chloride requires care in handling, and it is not advisable to use the drug for prolonged administration by itself, as it would tend to depress the heart.

The closed method of ethyl-chloride administration is not advocated by the writer.

ORIGIN, DEVELOPMENT, AND SUPPRESSION OF THE HUMAN CAECUM.

By Walter Stapley (Cambridge, N.Z.).

Comparative anatomy indicates that the human caecum became established to convert vegetable fibre into nutriment for the body. The necessity of this arose as the mammalian type was acquired, which type is the expression of the adaptation of animal tissues to elevated quadrupedal progression which the necessity of travelling the earth in search of food compelled.

It appears that man originated through those infinite activities that control the universe, and that his tissues express those activities that shaped the primitive cells of his origin and their subsequent generation. Just as certainly as bone has been shaped by active energies, so has the alimentary tube been shaped.

Although it is not possible to trace the construction of that fixed type of organism which is man from the time when a swarm of meteorites were massed to form our world, the mind insistently regards the power that shapes the universe as the causative factor of the animal cell and of life.

The myriads of activities that worked plastic types into fixed types, the countless succession of activities that have again and again smashed fixed types and again and again constructed new fixed types. make the ever elusiveness of plastic types natural, and the meaning of fixed types plain.

In the ever-increasing probability that active and latent energies control all things, inorganic and organic, the laws controlling the origin, development, suppression, and extinction of tissues are revealed.

The tissues of the body are established by those activities that make the functions which the tissues shall perform necessary to the organism. They develop in direct proportion to the functions which they perform. Developed tissues subjected to continuous cessation of function atrophy and form vestiges. Tissues that have lost their function become extinct when assailed by suppressive hostility.

Because in latent form vestiges express past activities, they persist. Activities which the body registers are transmitted in latent form by the germ-cells. Such is heredity.

The value which is ascribed to so-called anatomical rudiments fades away as it becomes apparent that they represent undeveloped tissues or vestiges. Although their presence is apparent, yet unweighed and unmeasured, the activities which compel the origin of animal tissues are ignored. The fraud of tangibility in the shape of so-called anatomical rudiments, and imagined architectures of the germ-splasm, usurp their place. The primitive protoplasmic masses which besetting energies wrought into animal cells did not, as Weismann would have us believe, create themselves. In them, as in all animal tissues, the causes of their origin precede their existence.

In the line of mammalian descent, vertebrates display the fact that the stomach and small intestines were established before mammalian type was acquired. Moreover, there are many mammals in which the caecum has never been evolved. Polar and Himalayan bears, Tasmanian devils and wolves, and Australian native cats are all caecumless, their intestinal tube having undergone no change from the type which their reptilian progenitors possessed, their food having been such that caecal function has never been called forth.

All mammals that have great caecal developement eat coarse herbage, and experience the necessity of digesting cellulose. The converse is not a fact—that all animals which eat vegetation have big caeca. The absence of a large caecum from the ruminants greatly puzzled John Hunter. He was baffled because he committed the general error of regarding the paunch, or rumen, as the stomach. The paunch is a pre-gastric acquirement for the digestion of vegetation. John Hunter made the brilliant and true observation thet there is a relationship between gastric and caecal function. He founded this truth on the error that the rumen performs gastric function, and as a gastric organ it robs the caecum of its function. Had he seen that the rumen does not perform gastric function he would have recognized that the animal economy arranges, in accord with the environment of the animal, whether vegetation shall be digested in post- or pre-gastric structures.

Food has caused three types of mammalian stomach to be established; they show the relationship of gastric to caecal function. The first of these is the stomach which is common to carnivora; it is a simple sac associated with a simple gut. The hyaena has the largest caecum amongst these animals; it is, however, a very small organ. As already pointed out, many carnivora are caecumless.

The accompanying photograph of the stomach, spleen, and indifferentiated intestines of the Tasmanian devil (Fig. 1) shows a perfect illustration of the type. It is quite caecumless. It needs no caecum because it eats no coarse vegetation.

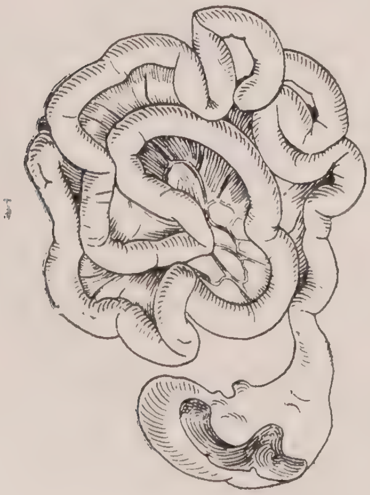


FIG. 1.

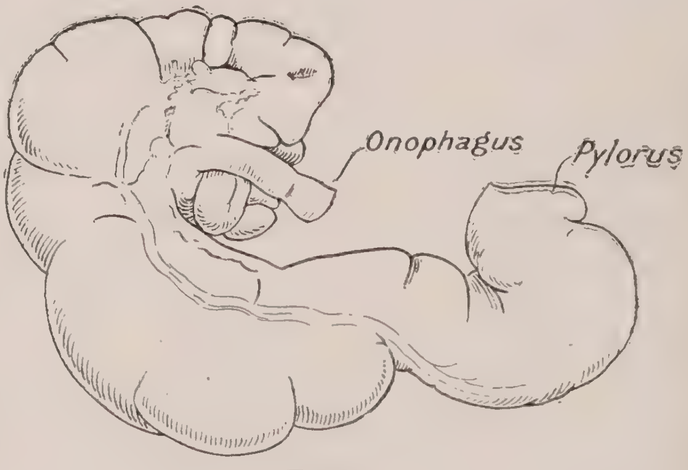


FIG. 2.

The second type (Fig. 2) is a complex stomach seen in kangaroos, wallabies, and an Indian monkey. In these animals post- or pre-gastric structures have not been adequately adapted to deal with vegetation. By our overburden the stomach has been distorted. The stomach of the kangaroo illustrates this type.

The third type of stomach (Fig. 3) is commonest amongst the mammals. It has remained relatively simple by adapting other structures to the digestion of vegetation. In ruminants such adaptations have been mainly in pre-gastric structures. In man and a host of other mammals the large bowel has been differentiated from the small gut so that cellulose shall be digested in the caecum and absorbed in the colon; and the work of absorbing the results of gastric digestion proceed without interference in the small gut. The advantages to the organism of the evolution and differentiation of the digestion-tube are apparent; the manner in which physical conditions have modified this tube are less so.

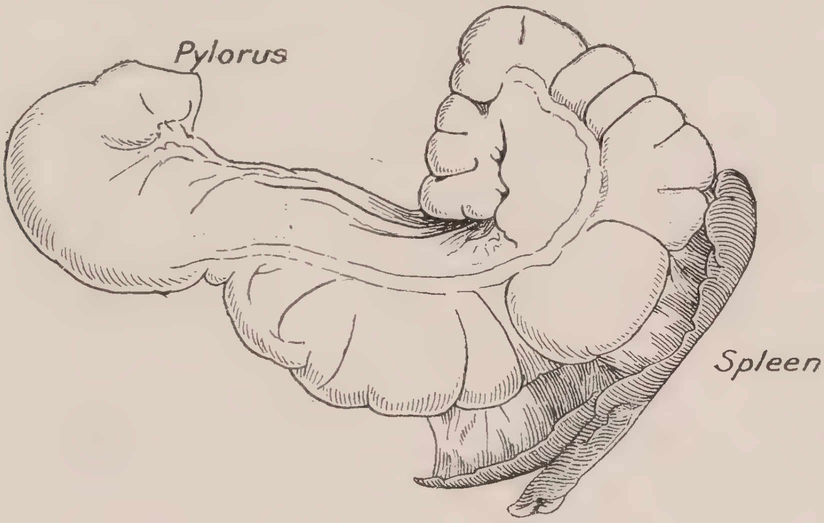


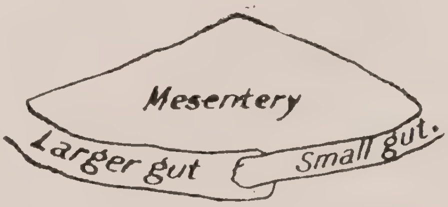
Fig. 3.

When ancestral man began to eat vegetation his stomach and intestines were unequal to the added function of digesting cellulose until the large gut became differentiated. Coarse vegetable matter having defied gastric digestion, was hurried towards the vent; but because the body lacked nutriment, colic spincteration retained the undigested material for further digestion. As the terminal gut became packed with vegetation, regurgitation into the small intestine threatened to interfere with the absorption of the products of gastric digestion. It became necessary to close that part of the gut rendering service to gastric products from that part of the gut devoted to the digestion of cellulose. This necessity compelled the evolution of the ileo-caecal valve.

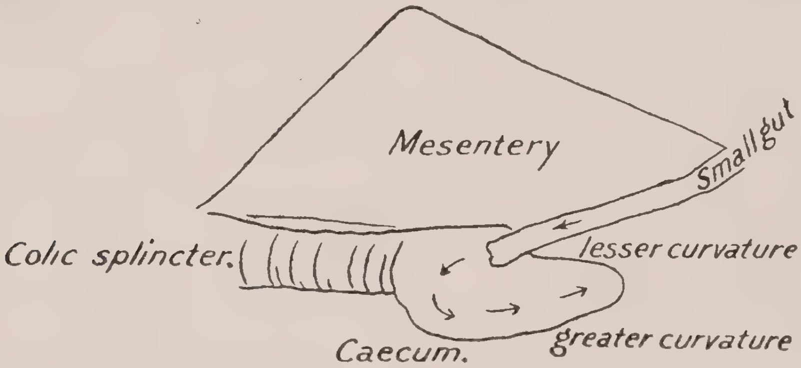
The soundness of the judgment of the old masters of anatomy is displayed in the fact that they accurately named the ileo-caecal valve. In the *British Medical Journal* of the 7th December, 1912, Dr. Arthur Keith claims that the ileo-caecal valve has a similar function to that of the pylorus. The error of this contention is displayed by the fact that the ileum is not succulated. The reason the ileo-caecal valve has an obscure function, to many thinkers, is its atrophic state. Like the whole human caecum, it displays retrogressive changes.

As the ileo-caecal valve developed, the musculature of the small bowel also developed; and ingesta was hurled through the ileo-caecal valve with force enough to bulge the walls of the large gut. The propelling force of the small intestine was the activity that caused the terminal gut to assume that character by which it is known.

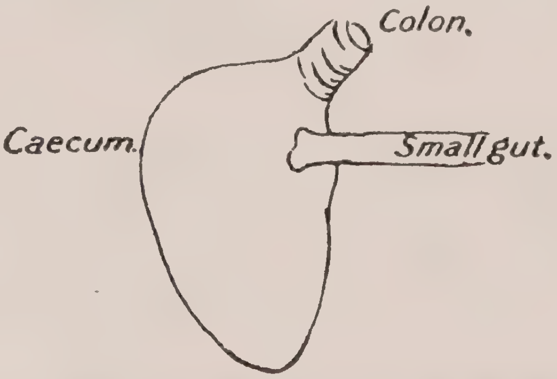
The ileo-caecal valve divides the gut into carnivorous and herbivorous sections. As it develops it produces an invagination, which anatomists have likened to a tap in a barrel.



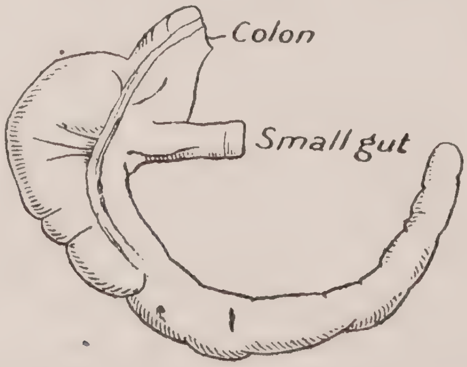
Colic splincteration, obstructing the outlet of the caecum, directs the propelling force of the small intestine against the free surface of the large gut, and so compels the greater curvature of the caecum.



The weight of ingesta within the caecum, which is always largely composed of water, drags the caecum across the ileo-caecal valve.



Periastatsis acting from the caecal apex causes the caecum to assume the characteristic shape of the fully functionating caecum.

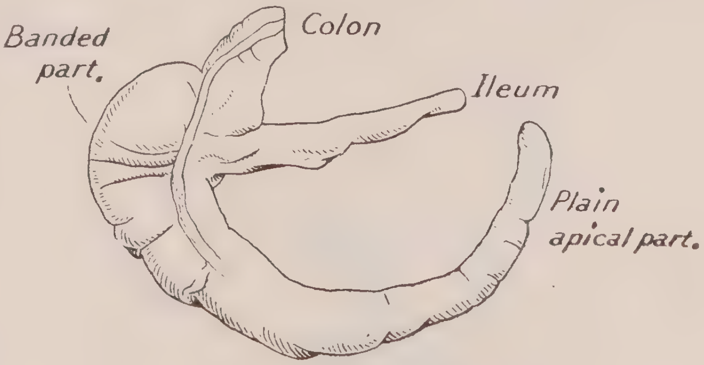


The formation of muscle-bands on the caecum and colon arose in an interesting manner. During the digestion of cellulose, gas is constantly generated. The functionating caecum of ancestral man was constantly distended with gas; and this internal tension ruptured the external longitudinal muscle in three vents. Through these ruptures, ingesta, covered by mucous and circular muscle-coats, was herniated. These hernias thrust the fibres of the external muscular coat aside and jammed them up into muscle-bands.

Man is not exceptional in having muscle-bands on his caecum. He is exceptional, however, in the fact that the bands do not extend to the caecal apex. The ruptures in the caecum of ancestral man extended only a short way down his long caecum, and left a long terminal part unruptured. During the involution of the caecum the unruptured apical part has atrophied into the vermiform appendix. Organs that perform those functions for which they were evolved remain of fixed type. Therefore, so long as primitive man loaded his caecum with food composed of cellulose, his caecum remained fully developed. The application of fire to food caused man's caecum to recede from the fully functionating type to that type of caecum which Treves depicts as type A. The development of mills and mechanical transport has induced types H to recede to types D.

Organs that have ceased to perform those functions for which they were evolved remain persistently as vestiges. The light nutritive diet of civilized man requires little or no caecal digestion. Therefore the vermiform appendix has lost all its functions, and the banded caecum is nearly functionless.

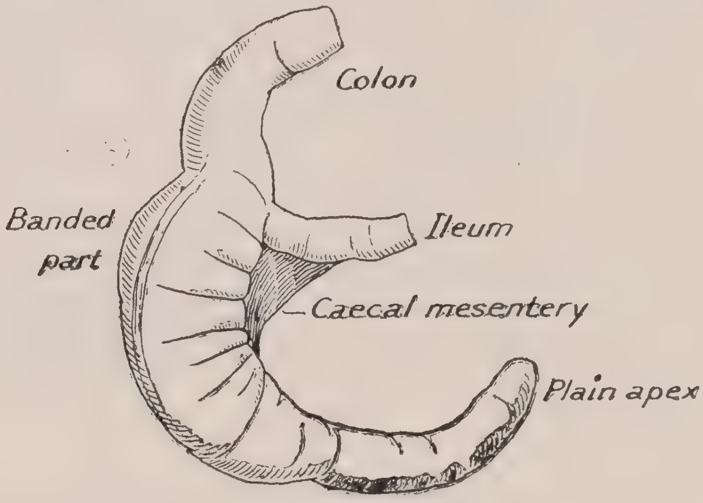
Organs in a state of atrophy from disease become suppressed or suffer extinction when subjected to hostility. The banded caecum has been suppressed by the retraction force of the muscular bands of the colon. As caecal content lessened, the muscular bands drew the caecum towards the colon, and atrophy took up the slack. The muscle-bands of the caecum deliver their pull at the junction with the unbanded apical part of the caecum. When the caecum has shrunk to that degree wherein the diameter of its lumen sets each and all three muscular bands in opposition, the plain apical part, except for a narrow channel, becomes shut off from the wide lumen of the banded caeca. Dangled at the end of the muscle-bands, it shrinks into the vermiform appendix by the simple process of atrophy from disuse. Following the extinction of the lower ends of the caecal bands by the pull of the upper parts of the bands, the upper parts are in turn suppressed by the pull of the colic bands. The unruptured apical part of the caecum is never submitted to the hostile pull of the muscle-bands. Therefore, because the vermiform appendix is submitted to no apparent hostility, it is likely to persist indefinitely.



Caecum of Ring-tailed Lemur.

It is not difficult to trace the involution of the caecum. Nearly all the lemurs display large caeca that are enclosed by an unruptured external muscle-coat. One of these animals, a ring-tail, has a banded and a plain portion of its caecum. Its photograph is shown above.

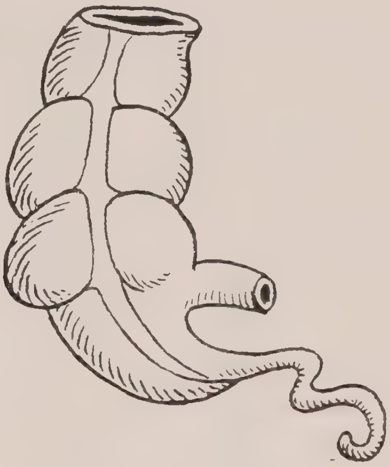
A loris has a caecum divided into a banded and a plain portion. It shows considerable recision from the large caecum of the lemur, and considerably more development than caecum A of Treves's types.



LORIS CAECUM.

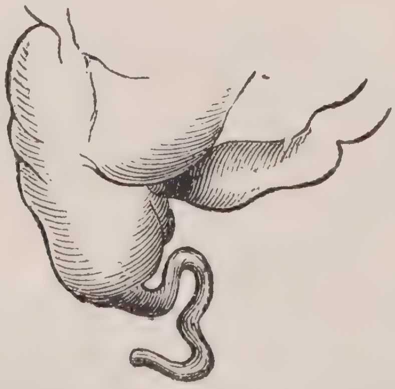
As retrogressive changes take place in the caecum it loses its tapering character, and becomes broader in the banded part and narrower in the apical part.

Passing from the loris caecum to Treves's type H, many retrogressive changes are noted.



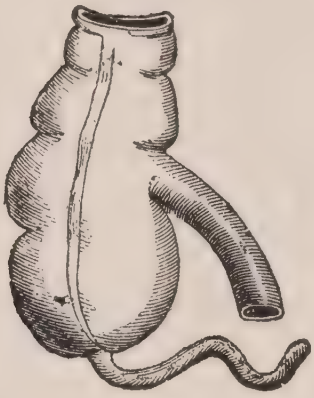
TREVES'S TYPE H.

As colic splincteration has disappeared the whole caecum has shrunk up.



CAECUM AND VERMIFORM APPENDAGE (HYLOBATES).

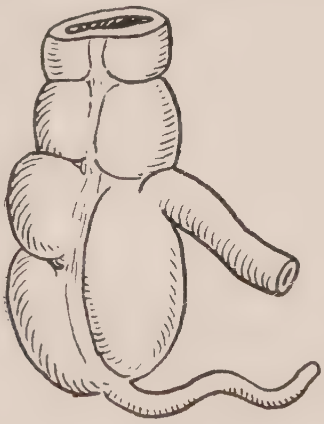
Richard Owne's drawing of the ileum, caecum, and vermiform appendix of a gibbon displays the earliest possible formation of this vestige.



Vermiform Appendix of a Silvery Gibbon (Hylobates Leuciscus).

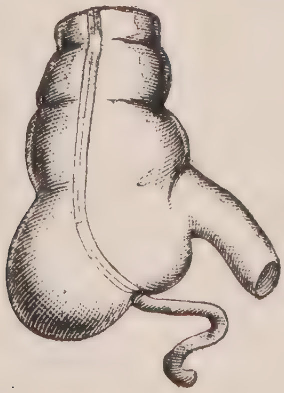
Bland-Sutton's drawing of the caecal area of a gibbon displays the vermiform appendix fully formed, and with a perfect illustration of that structure which is so vaguely described—the caecal fundus.

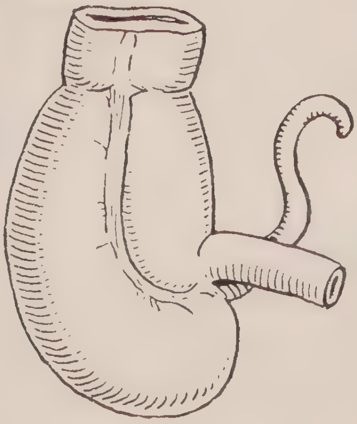
Whenever a vermiform appendix is formed, then also is formed that equally rare caecal shape—the caecal fundus.



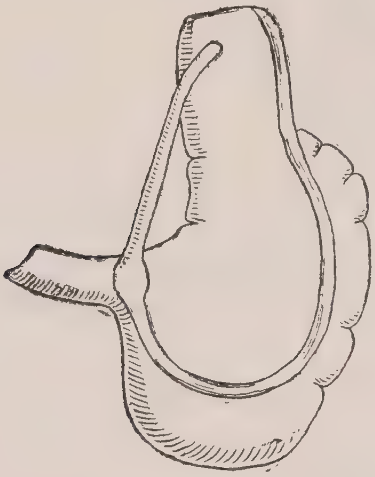
Type B.

Bland-Sutton's picture of the gibbon's caecum and Treves's type B of human caecum are alike. The type B caecum marks the formation of the vermiform appendix. Type H is a tapering caecum, with no appendix. It belongs to the preappendicular types.

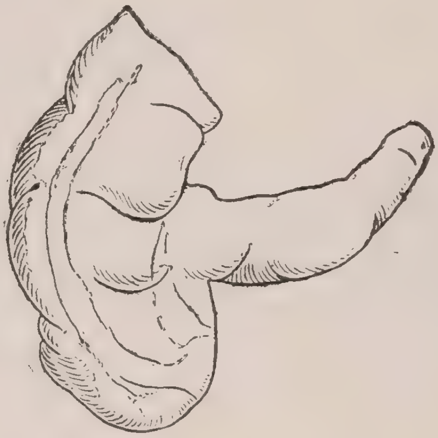




Types C and D show the appendix migrated from the caecal fundus to the ileo-caecal valve. This migration is due entirely to the pull of the meantime muscle-band. Type D shows complete suppression of the banded caecum, and all that remains in this type of the large caecum of ancestral man is its vestige—the vermiform appendix. Type D results from light nutritive food. When this type is assailed in prisons and elsewhere with coarse food a curious thing happens. The banded caecum, being extinct, cannot accommodate the coarse ingesta ; the vermiform appendix being too narrow, and being shut off from the lawen of the large gut by gravitation, is useless as a receptacle for food. The colon is dragged down ; the appendix turns up behind the colon. Surgeons have named this retro-colic appendix " retro-caecal." It forms an excellent example of colon mimicking caecum.



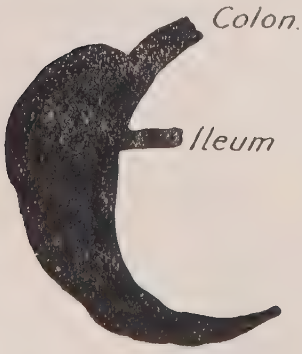
The So-called Retro-caecal Appendix. (Banded caecum extinct colon mimicking caecum.)



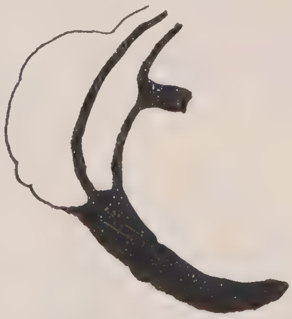
Drawing from Berry Collection, Anatomical Museum, Melbourne University.

The caecum of the baboon shows why a caecum that has ruptured to the apex cannot form a vermiform appendix during involution. The whole apex is drawn towards the colon, and nothing remains out of which to make a vermiform appendix.

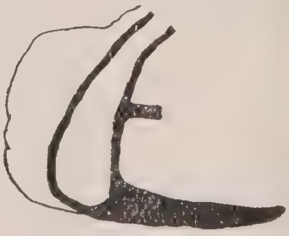
Diagrammatic representation of the involution of the caecum. External longitudinal muscle shown black, circular muscle white.



The Fully Functionating Caecum, before Rupture of the External Muscle.

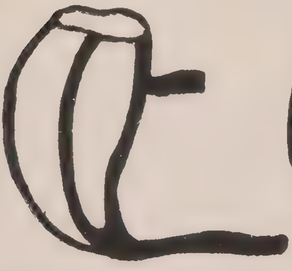


Ruptured External Muscle.

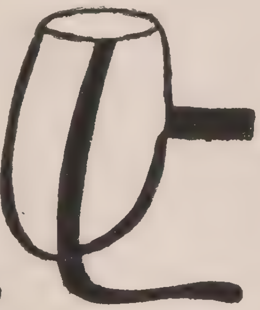


Further Involution Lessening of the Colic Grip.

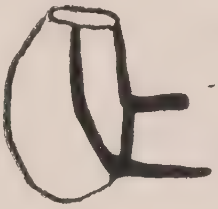
It is necessary to draw attention to the modern habit of promiscuously describing the vermiform appendix in animals that have it not, that never have had it, and never can acquire it. It is found only in man, the anthropoid apes, and the wombats. Those who describe the vermiform appendix in lemurs, pigeons, rats, ostriches, cats, and other animals are doing much harm to comparative anatomy.



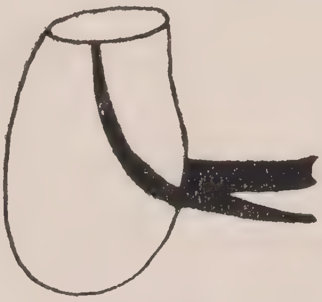
Treves's Type A.
(Simplified by omitting
Sacculations.)



Type B.
(Appendix
formed.)



Type C.



Type D.

It is well to again accentuate the fact that the alimentary tube of man is fitted to deal with food of combined carnivorous and herbivorous characters. A food that does not give all parts of the alimentary tube its due proportion of work is ill-balanced. A diet of proteid and sugar leaves the large gut without work; an exclusively vegetable diet overworks the large gut and leaves the body ill-nourished. More uncooked vegetation should find its way to our tables. Sound large bowels, just as much as sound teeth, depend upon sound food. Man needs to attune his food to those characters which, through the ages, he has consumed.

SECTION OF OBSTETRICS AND GYNAECOLOGY.

PRESIDENTIAL ADDRESS.

By Sir DAVID HARDIE, M.D.

MY first duty is to express appreciation of the honour the Executive Committee have done me by inviting me to take the presidency of this important section on this occasion. As a general practitioner I feel the honour is all the greater.

In accepting the position I make no apology on behalf of general medical practitioners that one of their number should hold it. This section embraces both obstetrics and gynaecology, and it seems to me not inappropriate that an obstetrician, with a working knowledge of gynaecology, should hold the position turn about with the gynaecologist, who has but a working knowledge of obstetrics.

In looking up Lippincott's medical dictionary I find that "gynaecology" is defined as "a treatise on woman, and the peculiarities of her constitution as compared with man"; or, again, "is the science which treats of the female constitution, and particularly of the diseases and injuries of the female genitals." In both these definitions the word "constitution" occurs. This is significant. It shows that the word "gynaecology" is a generic term, embracing not merely diseases of the female pelvis, but the much wider constitutional derangements peculiar to the female sex.

It so happens, too, that in some cases these are so interrelated as to make it exceedingly difficult to determine not only to what extent they are connected with one another, but whether the local or general condition is the primary affection.

This is well exemplified in the case of a woman who, while complaining of pelvic pain, presents all the symptoms of marked neurasthenia. Rightly or wrongly, she fancies all her trouble arises from disease in the pelvis. It lies with us to decide whether she is the subject of neurasthenia due to systemic causes, in which case the pain may be merely a local manifestation of her neurasthenic condition, or the subject of neurasthenia of pelvic origin, in which case the pain points to the primary seat of trouble.

Gynaecology, therefore, must necessarily cover a field that is wider than that contained within the bony walls of the pelvis. I am not here referring to the plea of a distinguished predecessor in this chair, who claimed for the gynaecologist an extension of his priority rights to the surgery of organs within the four walls of the abdomen.

It is because of the existence of this wider field that the gynaecologist must necessarily have received a thorough preliminary training in general practice, so that he may look upon the ailments of women from the broadest possible point of view. This is all the more necessary when we remember that he is the final court of appeal in women's diseases.

I am not sure that in this respect we do not expect too much from the specialist in gynaecology. Let us remember that he is from choice more a surgeon than a physician. No matter, therefore, how excellent his grounding may have been in general practice, it is only natural to suppose that his knowledge can be maintained and extended only in that channel along which the practice of his art has carried him. Outside that channel there are, it seems to me, occasions when the final decision should lie with the medical man in general practice, or, at least, when the gynaecologist should do honour to the general practitioner by asking for his opinion in consultation.

The history of gynaecology is one that cannot be surpassed in brilliancy by any other branch of surgery. Think of the distance we have travelled since Keith and Spencer Wells did their first ovariotomy, and Lawson Tait explained, and subsequently demonstrated by abdominal operation, the pathology of the pelvic haematocele. We have to thank Simpson and Morton for anaesthesia, Lister for Listerism, and these intrepid surgeons and others for their pioneer work, followed, as it has been, by the work of specialists all over the world, for the place that operative gynaecology now holds in the surgical world.

If any one has a feeling that the specialist has been overzealous in his work, let us not forget what we owe to him. Let us not forget that but for him operative surgery in the pelvis, including some of the major operations in obstetrics, would not hold the honourable and enviable position it now holds.

The advance made in abdominal and pelvic surgery has been so great that it would almost seem as if the *technique* could not be improved upon, and had been settled for all time. But that is not so. The fashions of daily life, in so far as the social habits of the individual are concerned, have changed with the times. So also has the technique of surgical operations in general and of pelvic operations in particular. What was considered the best yesterday is discarded for what seems better to-day. So will it be found to-morrow, and for all time to come. Let us be satisfied with the thought that if we have not reached perfection in treatment we are at least striving in that direction.

Take, for example, the changes that have occurred in the technique of ovariotomy, hysterectomy, hysterorrhaphy, and operations on tubal affections, and even in the method of stitching up the abdominal wall. Take the difference of opinion from time to time over the question whether the cervix should be incised, on the one hand, or stitched up on the other. Take the treatment of *retro-displacements*. Twenty years ago, and less, pessaries were as numerous and varied as the shells on the seashore, and their application in these cases universal. To-day they are conspicuous by their rarity. To-morrow we shall think they have their use in certain cases.

It has been said that pessaries can be legitimately used in only two classes of cases—in the very old for prolapse, and to correct retro-deviation in early pregnancy. Personally, I am not convinced that treatment by pessary is always the best in the latter case. The presence of a foreign body in the vagina in pregnancy is theoretically objectionable, and, moreover, the pessary occasionally produces a miscarriage.

In retroversion, at least, I prefer what may be called the postural plan of treatment. The patient is asked to present herself for examination every week, until the fourth month of pregnancy is completed. On each occasion an examination is made, so as to make sure that the uterus is not incarcerated. She is also told to lie in the prone position for an hour or two every day, or, preferably, to adopt the knee-chest attitude for a short time daily, if the position is not found too irksome.

There is one class of case that specially appeals to me for the application of the pessary, and that is in the case of a woman who has just been confined, and who is known to have had a retro-displacement formerly.

In this case the pessary is used not to give relief to symptoms, but with the object of preventing the recurrence of a previous displacement, and ultimately effecting a cure. One condition is essential to success. It must be applied before the heavy fundus has become retroplaced. Applied at this time the upper end of the pessary, in bearing on the posterior fornix, assists the cervico-sacral ligament in keeping the cervix backwards, while the forward position of the fundus allows proper retraction and involution of the round ligaments. If a well-fitting Hodge is placed in position when the fundus is beginning to recede from the abdominal wall the chances are that at the end of six months the patient will be cured of her displacement. Theoretically, again, the presence of a foreign body in the vagina is objectionable during the puerperium, but I have never seen it do any harm.

If any objection applies to the pessary in these cases the postural method of treatment as advocated by Solomons and Polak, in which the patient lies alternately in the right and left semi-prone position from an early stage in the puerperium, may be adopted. It is an ideal form of treatment, but, according to my experience, one which will be successful only if she is prepared to honestly carry it out for a sufficient length of time. As it is not always practicable to comply with this condition, postural treatment may be supplanted after the third week by the use of the pessary. The conditions are less exacting and the results good.

In this connection I may remind you that it is generally agreed that a careful examination of the pelvis should be made in every case a month after confinement. With that dictum I am thoroughly in accord, but consider it more important to also make an examination two weeks earlier. Retro-position begins from ten to fourteen days after confinement, and it does not take many more days for the fundus to fall completely into the pouch of Douglas.

An examination two weeks after confinement reveals, it may be, a tendency to retro-position ; an examination two weeks later still, reveals, it may be, an accomplished act. Prevention is better than cure, better still if the cure is doubtful.

Displacement of the uterus is an exceedingly common condition, and its prevention is a question that mainly concerns the obstetrician. As Dudley says, " The puerperium offers the best conditions for the prophylaxis and cure of descent."

When we remember that it is equally common in hospital as in private practice, even after the most scrupulous attention has been given to the immediate repair of perineal and vaginal tears and the prevention of puerperal infection, we are inclined to despair of being able to prevent its occurrence. When we remember that cervical tears are being neglected we wonder whether this neglect is justifiable. When we remember that hospital patients are usually discharged and private patients lost sight of from ten to fourteen days after confinement, and that retro-position occurs from the second to the sixth week, we begin to suspect that our work has been but half-accomplished. When we still further remember that many of the cases met with in practice might have been prevented by the timely use of the pessary, or by postural treatment, or by a combination of the two, it is time for us to realize that hospital patients should not be discharged under three weeks nor private patients lost sight of so soon. When we remember these things, then surely it lies with us to appreciate more fully the degree of responsibility that rests upon us when we attend women in labour.

Then, again, take the change in prognosis and treatment of gonococcal infections and pelvic tumours in general.

The time was when gonorrhoea was looked on as a trivial complaint, while tumours were considered inoperable, and therefore left alone. The pendulum has swung right across in both cases. Now we know that gonorrhoea may, and often does, lead to pelvic inflammation, adhesions, and suppuration, which requires an operation of sometimes a tedious and complicated nature. We also know that practically no tumour of a non-malignant and few of a malignant character are nowadays considered inoperable. The successful performance of Wertheim's operation for carcinoma is sufficient proof of this.

It is no exaggeration to say that of the two, an operation for the removal of a non-malignant growth is less complicated, and followed by better results, than an operation for the repair or removal of parts damaged by the *Gonococcus*. Much has been done in the treatment of pelvic suppuration, but the fact remains that, even so, the results are not so satisfactory, nor can they be so satisfactory, as in the case of most pelvic tumours that so prominently stared the helpless surgeon in the face in former days.

Is it possible that the days of operation for carcinoma of the uterus are numbered? This is not likely, and yet we are told that in Döderlein's clinic treatment by operation has entirely given way to treatment by radium and X-rays since February of last year. The results in some cases are brilliant, for out of 152 cases under treatment during that period thirty-one have been already discharged cured, and of the latter ten were inoperable.

It is a reflection on the morality of the present day that the great majority of these pus cases are the result of infection by the *Gonococcus*, and therefore preventable. Exclude the *Gonococcus* from the female genitals and the work of the gynaecologist would be materially reduced, while there would be less sterility and less chronic female invalidism. Can nothing more be done to prevent this deplorable encroachment on the well-being of our womankind?

The prevalence of tubal gonococcal infection is sufficient proof that the treatment of gonorrhoea is highly unsatisfactory. Nor can it be otherwise until begun at an early stage and vigorously carried out. In view of obvious difficulties, supplementary treatment by autogenous vaccine should be specially applicable for women.

The position is a delicate one for all concerned, and one requiring the exercise of special tact and firmness on the part of the medical attendant, but one that must be faced, and faced seriously. There is too much at stake to trifle with gonorrhoea in women.

I have alluded to the great advance made by the *surgeon* in gynaecology. Prior to him the *physician* was largely in evidence. Now come the *chemist* and *physiologist*, as if to show us that in combating the complex phenomena of women's diseases in previous days we had begun at the wrong end.

We now know what the operative gynaecologist has prepared us to accept, that the *ovary has a dual function to perform*—that of reproduction, and of secreting a substance that, in conjunction with the secretions of the thyroid, suprarenal, pituitary, and thymus glands, controls the nutrition of the genital organs, as well as the general body metabolism.

We are also told that a *correlation exists between the functional activity of the ovarian secretion and that of these ductless glands*, so that, in the event of an excess or deficiency of the former, the latter endeavours to maintain the balance of normal nutrition and metabolism. An account of the conclusions arrived at, as given by McIlroy, Blair Bell, Swale Vincent, and others, reads like a fairy tale, with this distinction: that it is attended by possibilities, in the future, of practical value in the elucidation and treatment of women's disease.

The knowledge already acquired has led to the use of the extract of one or other gland, or a combination of them, in cases of defective or excessive ovarian secretion, and sometimes with satisfactory results. It has also led us to resort to the transplantation of the ovary for the relief of those functional disorders attending amenorrhoea and the surgical menopause, and, so far as autogenous grafts are concerned, with fairly hopeful results.

Perhaps the time may come when a further knowledge of the *biochemistry* of chlorosis, amenorrhoea, dysmenorrhoea, and menorrhagia, supported by clinical data, may bring with it a substantial gain in the treatment of these conditions.

While operative gynaecology is a thing of yesterday, the *practice of obstetrics* is as old as the hills. The one rose with a suddenness and attained a brilliancy that stands as a lasting memorial to the work of the great Lister. The other remained for countless ages in its more or less primitive form, and only emerged from its state of ignorance and lethargy during the last half-century.

If more attention is now paid to the prevention of infection in labour, we owe it to the teaching of Lister. If more attention is given to the immediate repair of perineal and vaginal tears, if by vaginal and abdominal hysterotomy we are able to save lives of mother and child that were formerly sacrificed, we owe it to the gynaecologist. *The recent history of obstetrics is intimately connected with the history of gynaecology.*

It is true that in other directions considerable strides have been made in the science and art of obstetrics—our numerous publications are sufficient evidence of that—but it must be acknowledged that in some respects our present-day statistics do not show much improvement on those of our forefathers.

In one respect they are specially disappointing—I refer to *puerperal infection.* With the advent of Listerism great things were expected from the application of asepticism in midwifery, but so far the results, in private practice at least, are not very different from those of pre-Listerian days.

Here we have a condition that is undoubtedly due to the absorption of infective material through the placental site, or through tears in the perineum, vagina, and cervix; and yet, apparently, no matter how careful we try to be in excluding organisms from the vaginal passage in labour, the mortality from sepsis continues high.

Acting on the assumption that insufficient precautions are taken, and that it is impossible to properly sterilize the hands, it is only natural that the use of *rubber gloves* should be advocated. Most of us have used them, and some of us discarded them. To be consistent, why not also advise a rubber protector for the perineum? For obviously if the one is necessary so also is the other.

Another step in the same direction was taken by those who advocate *abdominal palpation* in place of vaginal examination. All honour to those who, for the cause of asepsis, advise this radical alteration in our method of conducting labour, but, in all conscience, let us be reasonable.

Let us hold to the opinion that infective organisms should be excluded from the vagina during labour, but do not let us advance the claim that this can be done only by the avoidance of vaginal examination. Are we to make it obligatory for the careful accoucheur to give up a habit that he has found to be attended by excellent results because others are less aseptic in their methods, and have less satisfactory results? Or, if the fault lies with the patient, are we to take it for granted that labour cannot be conducted under aseptic conditions in the case of a woman who is clean, whose bed and personal linen are clean, and whose home is clean, because it is impossible in the case of one who is dirty, whose bed and personal linen are dirty, and whose home is dirty? Let abdominal palpation be reserved for the latter, and it forms a very distinct advance in the treatment of labour.

It is said that the nature of the presentation and progress of labour can be as easily ascertained by *abdominal palpation* as by *vaginal examination*. Some of us are, I fancy, too old-fashioned to believe it, and are not likely to depart from a practice that has been found both safe and satisfactory.

Let me be not misunderstood. Let the obstetrician be as strict in the observance of asepsis of his hands and perineum as the surgeon is of his hands and field of operation. Other things being favourable, a vaginal examination under these circumstances is as safe as it is for the surgeon to handle his wound. And just as the surgeon should handle the parts as little as possible, so should the accoucheur examine his patient as seldom as possible. One or two examinations will suffice in normal labour. In no case should an examination be made without some definite end in view.

While one cannot but applaud the reasons which prompted the advocacy of abdominal palpation, and the use of rubber gloves, it seems to me that in our endeavour to prevent puerperal infection we must look further afield.

In reviewing the history of obstetrics during the latter half of the last century one thing stands out boldly, and that is that whereas in pre-Listerian days the mortality from puerperal infection was greater in public hospitals than in private practice, the reverse holds good at the present time.

Here we have material for serious thought and questionings. Why should the results be better in one case than in the other? If we can answer that question a big step will have been taken in the direction of reducing the incidence of puerperal infection in private practice.

In comparing *private* with *hospital practice* there are some points of similarity. In both cases a claim is made—when a qualified nurse is in attendance—that, as far as possible, aseptic methods are employed;

in both, we may take it, the management of labour is the same; in both the Dublin method of removing the placenta is used; in both autotoxic organisms, such as *Gonococci*, are occasionally present; and in both a proportion of the patients is naturally unclean. There are, however, some striking points of dissimilarity.

First and foremost, the hospital patient is cared for by *trained nurses* who appreciate the value of asepticism. The private patient, on the other hand, is often nursed by a *midwife* whose arrogance is equalled only by her ignorance. The only redeeming feature about the midwife is that she cannot hasten the delivery of the child. This, of course, is not always a virtue. She can, however, and often does, commit the greater crime of hastening the delivery of the placenta, and this, combined with her usually filthy habits, makes her attendance on women a positive danger. So long as the midwife exists we cannot hope to prevent infection in patients delivered in their own homes.

Secondly, the *delivery-room* in a hospital is surgically clean; there is no toilet-table, littered with the numerous delicate perquisites of the female sex, for the contamination of instruments and dressings. The tables are clean, the bed and personal linen are clean, and the patient is made clean. Compare this with the unclean bedroom of women at home in many cases, and more especially those in poor circumstances. Is it any wonder that sepsis is more common in private than hospital practice, no matter how careful the medical attendant and nurse may be?

Thirdly, compare the *hospital resident* with the *medical practitioner in private practice.* The former has no other duties to attend to, and has plenty of time to spare over his work; the latter has other duties on hand, and is in a hurry. The resident is on the spot, attends his patient when called for, returns to his sanctum if not wanted, leaves the case to nature till near the end of labour, uses the forceps only in protracted cases, and gives the necessary time to the delivery of the placenta and the third stage of labour. Should he require the services of the honorary accoucheur, the latter, who is not called till required, is prepared to give such time as the urgency of the case demands. The practitioner in private practice, on the other hand, is a busy man. He is probably called before being required, does not wish to leave till the confinement is over, is therefore tempted to use the forceps prematurely to hasten delivery, takes less time over the delivery of the placenta, and hurries away for important work elsewhere.

Is it not highly probable that by the operation of these three factors alone—skilled nursing, cleanliness of the room, and patience on the part of the medical attendant—we have an explanation of the better results in hospital, as compared to private practice?

If that is so, the lesson is obvious. First of all the midwife must go, and give place to the qualified nurse. The bedroom also must be made as clean as the hospital delivery-room, and the medical attendant must not hurry over the second and third stages of labour. Given these conditions, together with the usual antiseptic routine for medical man, nurse, and patient, and it seems to me puerperal infection would largely disappear in private as it has done in hospital practice.

So far as *cleanliness of the room* is concerned, much may be done even in the poorest of our homes. The nurse should see to it that instructions are given for scrubbing and cleaning the room beforehand, and for the removal of unnecessary articles of furniture; that the toilet-table is cleared of its rubbish; that one or two small tables covered with clean towels are provided for the use of the medical attendant, and clean linen for the patient and her bed. If these are not available, let them be provided out of the prospective baby bonus, so that the room may be made clean.

So far as *patience on the part of the medical attendant* is concerned, we reply that we cannot afford the time. If by that we mean that we are too busy otherwise, then we have no right to take charge of the case. If, again, we mean that our pay is inadequate, then in all seriousness let me advocate *increased remuneration.* There is no class of work less adequately rewarded than the work of the obstetrician, and in fairness to ourselves as well as to our patients let our obstetric fees be increased at least twofold.

We are called on to render expert service in one of the most important epochs of a woman's life, an event for which due provision should and could be made by all but the very few in this favoured country of ours. Did they but know it, and know it they should, better far for our patients to pay an extra five guineas to the accoucheur than fifty to the gynaecologist at a later date.

In this connection I would not apply the *quid pro quo* to attendance on the confinement alone. The time has come for us to take a keener interest in our patient from the time the engagement is made, and to let her understand that we are interested in the progress of her pregnancy, and expect to see her from time to time.

Whether *an examination of the patient* is absolutely necessary at the time of engagement I am not prepared to say. It may appear rash for a President of this section to admit this at a time when, in the opinion of our greatest authorities, an examination should always be insisted upon, in order to ascertain by pelvimetry what difficulties may be expected in labour. In theory this is a sound proposition, and is specially applicable in countries where contracted pelves are more common than they are in Australia. In this favoured country deformities of the pelvis are conspicuous by their rarity. In support of this I may say that during my experience of obstetrics for over a quarter of a century in Queensland I have not once, in private practice, met with a case of contracted pelvis that seriously obstructed the delivery of the child.

Apart from this, it is said to be important to examine the patient in order to ascertain the position of the child in utero, and, in the event of an abnormal presentation, to rectify, if possible, the abnormality.

From the former point of view it is certainly of interest, and may be of value to us, to know what the position of the child is. For this reason alone a pre-examination during the eighth or ninth month is eminently desirable.

So far, however, as an attempt to rectify any abnormality is concerned, it seems to me not worth while, unless in the case of a transverse presentation, to worry our patient over a matter that after all our efforts may not be successful in, and that can usually be attended to in a satisfactory manner during the confinement.

Apart altogether from this routine examination, which should be made in all cases towards the end of pregnancy, there are occasions when an examination must be insisted upon at any stage of pregnancy. The following is an instance of one of these: A patient, when engaging me about the fifth month, complained of what I considered unusual signs of pressure in the pelvis. A request for an examination was flatly refused, and only allowed after she was plainly told that I would decline to attend her unless she acceded to my request. I found the pelvis blocked by a fibroid that practically filled the pelvic cavity. Great was her astonishment when I told her that delivery of the child was an impossibility in the usual way, and that she must either have the tumour removed immediately or submit to Caesarian section at full term. She agreed to the former. I removed the fibroid, which was attached by a thick pedicle to the right side of the uterine body. She went to full time, and had an ordinary confinement.

The main value of an occasional visit from our patient lies in the opportunity these visits give, imperfect though it be, of looking for the signs of *the toxaemias of pregnancy*. This is all the more necessary when we consider how important it is to observe these signs before the toxaemia is fully established. In the early toxaemias this is naturally provided for from the fact that the symptoms complained of usually cause the patient to seek early medical advice. In the later toxaemias, however, the case is different. Here we are met by a condition whose gravity may become profound in the course of a few days, and for which she may seek advice when too late. An occasional visit from our patient will not therefore suffice to obviate the risk of toxaemia in the latter months of pregnancy.

It remains for us to adopt some routine method of surveillance so as to meet, as far as we can, contingencies of the kind. The method must be one that does not excite too much concern on the part of the patient, that causes her as little inconvenience as possible, and yet that must be fairly effective.

Knowing as we do that *the urine* provides us with a sensitive index of the state of our patient, it seems to me that these conditions are fulfilled by examining the urine, provided the examinations are made sufficiently often. Personally, I am in the habit of doing so weekly during the last three months in primigravidae and two months in multigravidae, while in toxaemic cases it may be necessary daily. A less frequent examination, even in normal pregnancy, is only trifling with our patient, and shows a distinct lack of recognition of our responsibilities. One cannot tell beforehand the case in which toxaemia may develop ; therefore, all cases are suspect.

In the event of albuminaria occurring we have thus the satisfaction of knowing that in nearly every case the toxaemia is of recent development, and, to a large extent, under our control.

I do not here minimize the importance of other signs of toxaemia, such as high arterial tension, nor the occasional inadequacy of even a weekly examination to give us the necessary warning ; but for the practical obstetrician, who may not have seen his patient lately, I know of no better or easier means of conveying to him the knowledge of the existence of a toxic condition than through a urinary examination.

What the extent of the examination shall amount to depends on circumstances. Important as it may be to find the ammonia coefficient, there is little hope of ascertaining this except in large centres of population, where laboratories are available for the busy practitioner. It is open to every one, however, to ascertain the specific gravity and the presence or absence of sugar, and more especially of albumen. Should the latter be found it is advisable also to test for the possible existence of acidosis, and to find the quantity of urine secreted in twenty-four hours. Sir Halliday Croom put this matter clearly before the last meeting of the association in England.

In respect to the importance of looking out for symptoms of toxaemia *one class is totally unprovided-for.* I refer to those who are unable to engage a medical attendant. To meet the needs of these, our public maternity hospitals must come to the rescue. On the one hand, let this class of women be advised to go to one of these hospitals for confinement, and, further, to notify the hospital authorities some months before the expected event. On the other hand, the hospital committee, if they rise to the occasion, will appoint a nurse whose duty it would be to visit the homes of these patients, to make observations, to examine the urine, to give such advice as she considers necessary, and to report to the Resident Surgeon. Furthermore, the committee will do what has been done in Edinburgh, as first advocated by Ballantyne—provide a prematernity ward for those whose condition demands more careful observation and treatment.

We are yet absolutely in the dark as to the origin of *eclampsia*, though hopefully looking for its solution in the near future. One thing at least has been established, and has helped us in prophylaxis, and that is that on account of incomplete metabolism in the liver and tissue cells the intake of nitrogenous elements in diet must be reduced to a minimum, and the output of waste products increased to its maximum, when convulsions threaten.

In a paper published in the *Australasian Medical Gazette* five years ago I specially noted that when convulsions are impending not only nitrogenous foods, but foods of any kind, including milk, should be absolutely withdrawn, and water alone given, and given freely for two or three days. This severe regime, combined with the usual measures for removing toxic products from the blood-stream, is usually followed by so marked an improvement in the patient's condition that we have now time to leisurely consider whether labour should be induced or pregnancy allowed to go on. The importance of insisting on this starvation diet for at least forty-eight hours cannot be too strongly emphasized. So far as I know, Tweedy is the only one who has drawn special attention to this point.

Occipito-posterior presentations, if left alone, will often rectify themselves as soon as the occiput bears on the posterior vaginal wall and resistant perineum, if not before. Should rotation not take place naturally, it must be accomplished in some other way, unless the head is proportionately small and delivers itself easily. Delivery by forceps, without rotation, is bad practice.

I know of nothing that can rectify the position so easily and safely as the operator's hand in the vagina, the patient being under chloroform, and delivery completed by forceps. There is no need to fear injury to the neck of the child if the body does not rotate, as it seldom does, in conjunction with the head. The extent of the rotation does not amount to more than a fraction over 90°, and the neck will bear a greater degree of rotation with safety.

The prophylaxis of *abortion* and *miscarriage* is a subject worthy of special discussion at a meeting of this kind. Our young and vast country is loudly calling for people to occupy its waste places; and while, on the one hand, immigrants by the thousand are introduced to swell its population, the loss by intra-uterine death steadily goes on at an alarming rate. I am not sure that we, as medical men, are doing what we can to prevent this frightful waste of foetal life. I refer specially to the need for finding out, if possible, the cause of every abortion or miscarriage that occurs in our practice. This is necessary for the intelligent treatment of the case now in hand, but still more for the prevention of the accident in future pregnancies.

Unfortunately, it is not always possible, even after the most careful examination, to definitely ascertain what actually caused the premature separation of the ovum from its uterine connection. If, for instance, as was first pointed out by Frankel, ovarian secretion, and more especially the secretion of the corpus luteum, is a factor in maintaining the nutrition of the ovum in early pregnancy, our difficulties are emphasized, for here we are introduced to a cause regarding the operation of which we practically know nothing, and over which we have, therefore, no control. Leaving this most interesting problem to be solved in the chemical and physiological laboratories connected with maternity hospitals, there remain for us, as clinicians, enough morbid material to investigate at the bedside of every abortion, and which is too often neglected.

Am I wrong in saying that if the abortion be inevitable our attention is so much taken up with the question of clearing out the uterus that other things are unconsidered and the case soon forgotten? This matters not when the cause is peculiar to the case under treatment, such as shock, accidental haemorrhage, or some zymotic disease. It is different, however, when the cause is one that if not removed will almost certainly lead to another abortion in the future, such as retro-displacement, pelvic or abdominal adhesions, uterine fibroid, endometritis, and syphilis. The removal of the cause must necessarily be carried out between this and the next pregnancy, and can be done only if we are fortunate enough to have discovered its exact nature.

Of these varied causes one is often overlooked, that of syphilis. Whitridge Williams says, "Syphilis should be suspected in all cases of miscarriage in which a perfectly satisfactory explanation for the accident cannot be adduced"—that is to say, even if there be no positive evidence of syphilis in either parent, the existence of latent syphilis may be assumed by a process of exclusion of other causes. This opens up a wide field for the application of specific treatment, and, if the assumption be correct, which I do not quite acknowledge, makes the treatment imperative, if not now, at least during the next and succeeding pregnancies, in every case of miscarriage the cause of which cannot otherwise be accounted for.

I have alluded to the danger of conducting *the third stage of labour* too hurriedly, and am of opinion that this is the most potent cause of puerperal infection. We cannot, of course, lay down any hard-and-fast rule as to how long we should wait before removing the placenta. Each case must be treated according to its own requirements. When, however, the time does come for its removal, let us not forget that compression of the uterus must be perfectly uniform. In exerting pressure, there is a tendency for the thumb in front and the tips of the fingers behind to indent the uterine wall. In other words, the pressure is uneven, and it is only fair to assume that we may have a correspondingly uneven detachment of the placenta from the uterine wall.

In examining a placenta after delivery one cannot help being struck with the frequency with which its maternal surface presents fresh vertical lacerations, extending to the depth of the chroion frondosum. These, of course, may sometimes be caused by rough handling after its expulsion, while the membranes are being dragged out. This should, as far as possible, be avoided, because in examining its surface it is important to do so in the condition in which it leaves the vagina. Apart from an accidental tear of the kind, there can be no doubt that the placental surface often presents these lacerations even when it seemed to have come away fairly easily. No harm has been done if it is seen that the cotyledons fit into each other. One can imagine, however, how easily, under such circumstances, a small nodule might be left behind, without our being absolutely certain. I am inclined to think that such is not unusually the case, and that uneven pressure over the fundus, by a misuse of the Credè, or what Jellett prefers to call the Dublin, method of expulsion, is the cause of this traumatic lesion.

In the *treatment of puerperal infection, presumably due to a retained nodule of placenta,* I have not for many years advocated the use of douchings or curette. The douche may remove infective organisms, but cannot remove the cause. To do this by curette is not free from danger. The fingers alone, followed it may be by the douche, can be trusted to perform this delicate operation.

Post-partum haemorrhage, a subject which was exhaustively dealt with by Dunbar Hooper at the last Sydney Congress, requires more prompt attention than any complication in labour. Personally—and let me here express the hope that you will pardon me for having introduced the personal element so much in a presidential address—I do not waste time with douches, packs, and suchlike. The uterus is grasped firmly with the left hand, anteflexed, and compressed against the resistant pubis. The haemorrhage, if from the fundus or body, is at once under control. Failure to control it in this way indicates cervical haemorrhage, for which the parts may be packed with gauze or stitched up.

Control of the haemorrhage must be maintained absolutely for at least an hour and a half. The patient has already lost much blood, but cannot afford to lose any more. As J. A. Cameron said, in his paper on ante-partum haemorrhage at the Sydney Congress, "A very little post-partum haemorrhage may turn the scale." Like the last straw, it is the repeated slight leakages and expression of small clots after a severe haemorrhage that finally tell on the heart and nerve centres.

The mention of *douches* reminds one of the time when they served as a cloak to cover our ignorance and a multitude of sins. Thanks to Kronig and Whitridge Williams, we now know that any bacterial flora that exists in the vagina is, under ordinary circumstances, non-pathogenic, and even to some extent protective against the invasion of pathogenic organisms. In view of this fact, I cannot see that vaginal douchings should be used indiscriminately after the completion of labour, provided careful measures have been taken to prevent septic infection. Nor do I think they should be used in a routine manner after difficult labour simply because the labour has been a difficult one involving unusual manipulation and the use of the forceps, unless there is reason to suspect septic invasion. This alone should be the determining factor. The "aseptic conscience" is a healthy and natural development of the times, so long as it does not show neurasthenic tendencies, and see a bogy in every cranny. At the most, douchings are but fragile reeds to rest upon, if effective antiseptic precautions are not otherwise strictly observed. According to my experience they are not necessarily required even after forceps delivery, version or manual removal of the placenta; nor need they be given if the operator is confident that his hands and instruments and the maternal parts are obstetrically clean.

PELVIC EXUDATION.

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Pelvic exudation is sufficiently common amongst a list of hospital and private patients as to warrant me bringing the subject under your notice; and yet withal how difficult it is to say in a number of cases to what the condition is really due, before an exploratory operation is performed.

The infecting organisms may be the common pus cocci (*Streptococci, Staphylococci, Gonococci, Pneumococci, Bacillus coli,* &c.). Parasites from the rectum and bladder have easy access to the genitalia. Diathesis is supposed to play a part—*e.g.*, gout, rheumatism, anaemia, diabetes, &c. The anatomical relations of the parts favours the invasion of the micro-organisms. The genital tract from the vulva to the peritoneum is an open canal. The peritoneum and cellular tissue are brought into relation with the external skin-surface through the mucosa, which stretches from the vaginal orifice to the fimbriated extremity of the Fallopian tube.

Abortion and Childbirth.—Infection is favoured by raw surfaces produced by abortion and childbirth. The course of infection may be by continuity of mucosa or by the lymphatics or blood-vessels. Gilio maintains that infection by the vessels is more frequent than by continuity of surface. Infection by the veins is common in puerperal cases. Wertheim concludes from experiments that *Gonococcus* infection can pass through pavement epithelium and connective tissue so as to reach the deeper lymphatics and vascular channels, and be carried to the tubes, ovaries, and peritoneum. In pelvic cellulitis the affecting organisms gain access to the cellular tissue through the lymphatics from the cervix. Laceration of the cervix, which is more common on the left side than on the right, is a common cause of sepsis following labour or abortion, and, apart from labour and abortion, curetment or operations on the cervix or vagina.

Chronic lesions of streptococcic origin are commonest in the cellular tissue. Unlike the *Gonococcus*, the *Streptococcus* does not usually progress along the mucosa into the tube. Of course, in exceptional cases *Streptococci* pass into the tube. The views of Sir Harry Allen, of Melbourne, as expressed before the Melbourne Branch of the B.M.A. are opposed to this, and he holds the opinion that the common route of streptococcal infection is by the mucosa to the tubes and peritoneum. The more common lesions associated with pelvic infection are pelvic cellulitis, peritonitis, salpingitis, &c.

Pelvic cellulitis, like inflammation of cellular tissue elsewhere, is essentially an acute or subacute lymphangitis resulting in re-solution, abscess-formation, or unabsorbed exudate. As you are aware, the cellular tissue extends between the layers of the broad ligament passing upwards into the iliac fossa, and downwards as far as the fascia covering the levator ani. In front is the cellular tissue at the base of the broad ligaments. Thus we see the cellular tissue extends from the broad ligaments forward round the bladder, backwards towards the rectum. When septic infection takes place it may spread forwards, outwards, or backwards, following the course of the cellular tissue. When it happens, the blood and lymph vessels are plugged here and there with firm inflammatory thrombi. If re-solution does not take place the thrombosis breaks down, and the corresponding spaces are filled with pus. In severe cases the whole of the cellular tissue of the pelvis may be involved. The most common situation is in the tissue at the base of the broad ligament; an inflammatory exudation is caused by the infecting organism. The tissues become oedematous. The result is a firm swelling at the side of the uterus, pushing that organ to one side, or between the bladder and abdominal wall, bladder and uterus, or along the utero-sacral ligaments. The exudate may attain a very large size. Usually a definite cause can be found, as I have mentioned before—labour or abortion. The common symptoms are pain in the lower abdomen, tenderness and rigidity of abdominal muscles, increased temperature and pulse, and the patient lies on the back with the knees drawn up.

Diagnosis: The diagnostic points of pelvic cellulitis are—Tumour usually at one side of the uterus; at first hard, the swelling has been likened to plaster-of-paris; bulging of one or other lateral fornix; seldom surrounds the uterus; mass low in the pelvis and easily palpated; great tendency to suppuration; uterus generally displaced laterally.

Pelvic Peritonitis (or Perimetritis, as it has been called).—In this condition we must first consider the distribution of the peritoneum. You doubtless remember that the pelvic peritoneum covers the concave surface of the floor of the pelvis. Beginning on the anterior wall of the abdomen behind the pelvis, and passing downwards and backwards, it covers first the posterior surface of the bladder. In this situation it is loosely adherent, and has more or less cellular tissue under it; from the bladder it reaches the uterus, just below the level of the internal os, and there rises over the anterior aspect of the uterus. This lowest position forms the vesico-uterine pouch. Passing over the fundus, where it is loosely adherent, it is continued over the posterior surface of the uterus to a point a little below the level of the internal os, where it leaves the uterus to dip down deep into the pelvis to form the *cul de sac* of Douglas. At the sides of the uterus the peritoneum passes to the side wall of the pelvis as the anterior and posterior layers of the broad ligament. Behind the uterus the utero-sacral ligaments pass from the junction of cervix and body to the third sacral vertebra.

Pelvic peritonitis is the more common of the two forms of pelvic inflammation; it is usually secondary to salpingitis; it may follow the escape of blood or pus from the abdominal ostium of the tube; or it may follow septic metritis, cystitis, perforation of the uterus, appendicitis, and psoas abscess. The *Gonococcus* and *Streptococcus* are the most frequent causes.

The symptoms of acute pelvic peritonitis are pain and tenderness in the lower abdomen, rigidity of abdominal muscles, tenderness on examination of both abdomen and vagina, increased temperature and pulse, nausea, and vomiting. If the resistance is low you may have extension to the general peritoneum. The tubes become glued to the uterus or to the pouch of Douglas. The coils of intestines frequently become adherent. In some instances the omentum walls off the process. If the tubes do not become closed, and pus is poured out, the pelvic peritoneum is affected, and an exudate results. Usually the infection remains localized, and shows little tendency to become generalized over the abdominal peritoneum. On P.V. examination the uterus and appendages may be bound down. The uterus is usually surrounded and fixed by infiltrate, blocking up the fornices round the uterus ; the mass felt high up in the pelvis ; tendency to suppuration not marked ; you have fixation of structures rather than exudation that can be felt.

Chronic type : Two chronic forms of pelvic peritonitis are tubercular and malignant. Tubercular often starts in the Fallopian tube, or may be a miliary tuberculosis ; may take the form of pyosalpinx. The swelling is sometimes due to matting of bowel or free fluid often associated with tubercular peritonitis.

Malignant affections of the peritoneum, secondary to malignant disease of the ovary, are recognized by combined recto-vaginal examination, when nodules may be felt between the fingers.

Acute salpingitis, ending in pyosalpinx : The inflammation may subside completely, leaving thickening and adhesions. In some cases the tube is much thickened, particularly in chronic cases. As a sequence to the inflammation, the ostium becomes closed, the lumen dilated, and a pyosalpinx results. It is most difficult to distinguish between appendicitis and right-sided salpingitis if the appendix is hanging over the brim of the pelvis. I operated on a case of this description in the Women's Hospital. P.V. examination, mass in the right broad ligament, had frequently passed pus in her urine, other times quite normal. On opening abdomen parts much matted together, omentum adherent to bladder and right B.L. On separating the adhesions appendix was noticed lying on the anterior layer of the B.L., attached by its tip to the base of the bladder ; on separating the adhesions a pocket of pus appeared ; this communicated with the interior of the bladder, evidently the cause of the pyuria.

Pyosalpinx may therefore be diagnosed by the history of the infection ; mass felt on both sides of body of uterus or behind in Douglas's pouch ; sharply outlined, sausage-shaped or retort-shaped ; limited mobility ; may fluctuate or be hard and resisting when exudation has taken place ; usually bilateral.

Mode of onset depends on virulence of infection. Some cases come on suddenly, with acute pain in abdomen ; pulse and temperature increased ; rigidity of abdominal muscles. Appendicitis may simulate this condition, particularly if the right tube is affected. In appendicitis mass high up in pelvis, surrounds caecum, usually only reached by vagina or rectum with difficulty, high location of painful area, intestinal disturbance preceding or accompanying the attack. In some cases, particularly the one I have mentioned, *it is impossible to give a correct diagnosis until the abdomen is opened.* Dr. R. T. Morris has directed attention to two points of tenderness which he considers of great assistance in distinguishing between chronic salpingitis and chronic appendicitis. One point is situated 1½ in. from the umbilicus on a line drawn from the umbilicus to the anterior superior spine, and the other is a similar line on the opposite side. These points are approximately over the lumbar glands which receive the lymph vessels from the tubes, ovaries, uterus, broad ligaments, and appendix. McBurney's point is on the same line on the right side, 1½ in. from the spinous process. The right Morris's point is tender on pressure in case of chronic appendicitis not involving the F.T. sometimes, when even McBurney's point is not tender. In case of salpingitis, either unilateral or bilateral, both these points are tender.

Apart from infection, *tubal pregnancy* is another condition that gives rise to an exudate in the pelvis. The two most marked symptoms of this disease are severe attacks of pain recurrent in character, followed by haemorrhagic vaginal discharge. The pain is generally referred to the right or left ovarian region. The pain may at times be accompanied by faintness or vomiting. The blood effused may have been encysted, forming a haematocele. On examination a swelling may be found rising up to the hypogastric. The swelling is tender and somewhat elastic and dull on percussion. The uterus is pushed forward; the blood may fill up the pelvis and bulge down the posterior fornix, or it may escape more slowly from the damaged tube and gravitate into the pelvis, being shut off by the matting of the intestines above which form a roof to the haematocele; bimanually the uterus will be found to be enlarged, pushed to one side, and a swelling of unequal consistence, partly elastic and partly firm, in the posterior quarter of the pelvis. The swelling may be capable of a certain amount of mobility, the size of a duck's egg or larger. The appendage on the opposite side may be quite normal. An important point in diagnosing extra-uterine pregnancy, according to Baumgaten and Piffer, is the presence of acetone in the urine in all cases, exacerbations of pain without apparent cause and without decided elevation of temperature. In salpingitis, with the patient quiet in bed, such exacerbations of pain could only be caused by an increase in the inflammation, and this would be accompanied by a decided rise in temperature. Signs of pregnancy may be present as stomach-disturbance, missed period, softening of cervix. The first indication may be one of internal haemorrhage, severe pain in lower abdomen, accompanied by sickness and faintness, pallor, rapid pulse, subnormal temperature; sudden onset without previous warning apt to occur when the pregnancy is in the isthmus. Irregular haemorrhages after a period of amenorrhoea is the commonest sign of tubal pregnancy.

Psoas abscess may simulate pelvic exudate, but usually you have a history and symptoms of tuberculosis. Spondylitis, no history of acute inflammation, flexion of right leg.

Subserous myomas have been mistaken for pelvic exudate. Here the contour of the tumour is sharply defined; tumour intimately connected with the uterus.

Ovarian tumours are diagnosed as smooth non-sensitive cystic swellings one side of the uterus; on pushing uterus, to separate from tumour, find not enlarged.

Torsion of the pedicle gives rise to acute symptoms that have been mistaken for appendicitis and extra-uterine pregnancy, and the venous return from the tumour is interfered with. If torsion is more marked the arterial supply is cut off. Intestinal and omental adhesion form, or there may be secondary invasion of the tissues by the B.C.C.

In a typical case the patient is seized with acute abdominal pain, followed by sickness and vomiting and rigidity of abdomen. Pulse and temperature increased. On examination the tumour is found to have become larger, more tense, and tender. The presence of such symptoms and physical signs are diagnostic of the condition.

Dermoids are very liable to infection. The infecting organism may be the *Streptococcus*, *Staphylococcus*, *Bacillus coli*, the latter being the more common infecting agent. Gradually increasing pain in the abdomen; rise of temperature and increased pulse-rate; tumour tender and increased in size. Very often there is a considerable amount of exudation into the pelvis, as I have seen in several cases. Until the exudate cleared up it was impossible to make a diagnosis.

Treatment.—With regard to treatment for pelvic exudate, in my opinion a considerable proportion of pelvic inflammatory masses disappear without operation if only given a chance to so so. I have seen this happen so frequently, particularly in cases that came under my notice that refused operation for one cause or another, that I now invariably try some palliative treatment before adopting the more radical one of abdominal section.

Gonoccocic pus in the tube becomes sterile in six or eight weeks, or it may, on the other hand, remain active much longer. In gonoccoccal infection the bacteria are dead, or attenuated to practical sterility, within three or four months from the beginning of the trouble. Abdominal section may be safely undertaken after that period if the condition has not cleared up.

In streptococcal infection, on the other hand, the bacteria live and retain their virulence much longer. Abdominal section for streptococcic mass is liable to be followed by fatal peritonitis. Should the abdomen be opened on the supposition that the mass is tubo-ovarian, and it is found that the mass is principally in the cellular tissue, parametritis, the route of attack should be changed to extra peritoneal per vaginam, or above Poupart's ligament. Such lesion probably contains *Streptococci.* There is always great danger in abdominal operations for inflammatory masses following puerperal sepsis. The abdominal route is absolutely fatal in my experience in such cases. Rest, hot douches, plugging with ichthyol should be the routine treatment adopted in the first instance in the majority of cases. If after waiting a reasonable time the condition does not improve, then the question of operative procedure may be taken into consideration.

THE DIFFERENTIAL DIAGNOSIS OF ECTOPIC GESTATION.

By J. MacNaughtan Christie, M.D., C.M. (Glasgow), F.R.C.S.(Edin.).

Ectopic gestation may be either ovarian or tubal. The debatable point as to whether there is such a condition as primary peritoneal pregnancy I do not intend to follow up just now. So far it has not been satisfactorily demonstrated, although a number of supposed instances have been recorded. Ovarian pregnancy, over which discussion raged for some years, has been definitely proved. I have had the opportunity of seeing one fresh specimen, and also sections of the same, which were absolutely definite. Ovarian pregnancy always terminates at an early date by rupture, and it is improbable that this form of gestation can last for more than a few weeks. When one considers that the fertilized ovum is growing either in a Graafian follicle or in a bed which it has eroded for itself in the ovarian tissue one can see how impossible it is for the pregnancy to continue long, and to grow to any size without rupturing its walls. The differential diagnosis of ovarian from tubal pregnancy is at present impossible.

In considering the differential diagnosis of ectopic gestation I have divided the conditions into those met with—(1) Before the occurrence of internal haemorrhage; (2) after the occurrence of internal haemorrhage. In this broad classification I have included under "internal haemorrhage" both rupture of the sac and tubal abortion.

(1.) Before the Occurrence of Internal Haemorrhage.

It is comparatively seldom that one gets a case of ectopic gestation at this stage. The early symptoms may be only some of the general symptoms of pregnancy. There may be a cessation of menstruation—the patient may have missed one or perhaps even two periods—there is discoloration of the vagina, and the patient believes herself to be pregnant. Sometimes she feels as if the pregnancy was not all right, and will tell her doctor so—for instance, she may have colicky pains in the lower abdomen or on one side. Pain and occasional fainting and haemorrhagic vaginal discharge precede the collapse, and often precede it for a considerable time. The pain is usually aching in character, with more or less acute exacerbations. It is accompanied by rigidity more marked on the affected side. The pain comes on usually after one menstrual period has been missed; rarely does one see a patient who has missed two periods; more often it comes on before the patient has missed one period. The haemorrhagic vaginal discharge is usually preceded by abdominal pain and discomfort. Bell, in eighty-eight cases, found that pain was the first symptom in 58 per cent. and haemorrhage in 41 per cent.

It is necessary to differentiate those symptoms from what one might find in—(*a*) Normal pregnancy; (*b*) abortion; (*c*) fibroids; (*d*) adnexal inflammatory disease; (*e*) ovarian tumour; (*f*) appendicitis; (*g*) carcinoma.

We must now consider each of these points a little more in detail.

(*a*.) *Normal Pregnancy*.—In ectopic gestation we have all the symptoms of normal pregnancy, with something added. The patient may state that she thinks she is pregnant, but believes there is something wrong or unusual with this particular pregnancy. If a patient comes to you with this history do not treat it lightly, but be on your guard, and remember the chance of its being unruptured ectopic gestation. The history may bring out the fact that there has been a long period of sterility following the birth of her last child, and perhaps a story of septic inflammatory trouble at the time of the confinement. One should also find if there is any history suggesting gonorrhoeal infection. Too much weight, however, should not be attached to the length of time since the last child was born, as one sees many cases where there is no such long interval. Severe recurring pains are often present, usually to one side of the lower abdomen. There may also be marked tenderness laterally. One may also note the absence of Hegar's sign, which is so valuable in the diagnosis of early intra-uterine pregnancy. We may find an enlargement on one side of the uterus. If the ovum is in the infundibulum or ampulla some leakage may occur into the lumen of the tube, and this may pass out into the uterus and appear as red vaginal discharge. Irregular haemorrhage after a period of amenorrhoea is one of the commonest symptoms. It may occur from the beginning without any amenorrhoea. Decidua may be detected in the discharge, or the decidua may come away entire, forming a cast of the uterus. This latter, although mentioned in all the text-books, is really very rare. If the pregnancy has gone beyond the third month the uterus will not be as large as it would be if the pregnancy were intra-uterine. It is very unusual, however, to get an unruptured ectopic pregnancy which has gone so far.

(*b.*) *Abortion.*—May be easily diagnosed when the real condition is an ectopic gestation. Munro Kerr says that when one is called to a supposed abortion one should always ask oneself the following: (1.) Is the woman pregnant? (2.) Is the pregnancy uterine or extra-uterine? (3.) If uterine, is the pregnancy threatened, complete, or incomplete? This is excellent teaching, and if in practice it is kept constantly in mind one would see fewer cases of ectopic gestation mistaken for uterine abortions. In this class of case the history does not help us to any great extent, as we have already seen that the early symptoms of ectopic gestation are very like those of normal pregnancy; and if we add to those the pains and haemorrhage, we have a history which might easily be mistaken for uterine abortion. If in doubt one should examine carefully under an anaesthetic, feeling particularly for any enlargement of the tubes. If necessary one might use the uterine sound. It is often advised to use the curette to clear up the point. If one accepts this advice one must proceed most carefully, as there is danger of setting up violent contractions in the sac, which may easily lead to rupture; or one may injure and infect the uterine tissues. Another point against the general use of the curette is that, although one could generally say from a microscopic examination of the scrapings brought away whether the patient was pregnant or not, one could not say whether the pregnancy was uterine or extra-uterine. Only if chorionic villi were found present could one say it was uterine, as the decidua in uterine and extra-uterine pregnancy are indistinguishable from one another either microscopically or macroscopically. You will see, therefore, that the only way of diagnosing an ectopic gestation from a uterine abortion is by a careful examination, if necessary under an anaesthetic, the feeling of an elastic swelling with pulsating veins in the region of a tube or ovary, along with a detailed history of the case.

(*c.*) *Fibroids.*—It is very rare to find ectopic gestation with fibroids. The period of life—twenty to thirty-five—when tubal gestation occurs most frequently is a comparatively quiet time for fibroids. On examination one will not get an enlargement in the tube, as fibroids do not occur in the tissues of the Fallopian tubes. Fibroids are simulated by the haemorrhage, which is a clinical feature associated with some conditions of tubal pregnancy, as we have seen. It is seldom that difficulty in diagnosis arises in the earlier stages before rupture of the tube. The most difficult cases to differentiate are those of interstitial ectopic gestation. The principal points, however, are brought out if one carefully considers the history. It would be most unusual to find the history of amenorrhoea and other early signs of early pregnancy in a case of fibroids. Also, if pain is present, it is not nearly so severe as that found in ectopic gestation. On examining a case of ectopic gestation one finds that the sac is excessively tender, which is certainly seldom the case with a fibroid growth.

(*d.*) *Adnexal Inflammatory Diseases.*—In salpingitis we may have a certain amount of enlargement of the tube, but usually not anything like the localized enlargement of an ectopic gestation. Salpingitis disposes many women to menstruate ahead of time; ectopic gestation apparently delays the last or alleged menstruation, and when it appears it differs in one or several particulars from the previous menstruation of the individual. Salpingitis is usually on both sides, although one tube may be worse than the other; ectopic is one-sided. In salpingitis we get a leucocytosis. In acute conditions we would have the temperature elevated. Rectal examination is of the greatest use in determinating the feel and character of the tube. As a rule, however, a pregnant tube is the softer. *Gonococci* and evidences of vulvar and cervical gonorrhoea should looked be for, and, if found, would point to inflammatory tubal disease.

(*e.*) *Ovarian Tumour.*—If small, this may be mistaken for an unruptured ectopic gestation. Here the diagnosis must rest principally on the history, and inability to differentiate the ovary. The ovarian cyst would probably be much more movable than the sac, and the cyst would not be nearly so painful as the sac. I had a rather interesting case of this sort. The history suggested ectopic. On examination I felt a swelling in the left tube, and diagnosed unruptured ectopic. The following morning I opened the abdomen, and was surprised to find a cyst of the right ovary with an exceedingly long pedicle. The cyst had swung right across the pelvis, and was adherent to the left tube. On examining the left tube, however, I found what I suspected—a tubal pregnancy. The cyst of the right ovary was adherent to the back of the sac in the left tube.

(*f.*) *Appendicitis.*—Before the occurrence of the internal haemorrhage the symptoms may resemble those found in subacute or chronic cases of appendicitis. The error is more likely to happen in a right-sided ectopic pregnancy. The history, character of the pain, location of the pain, pulse, temperature, blood count, and the finding of normal tubes and ovaries put ectopic "out of court."

(*g.*) *Carcinoma.*—Cancer of the uterus is not always productive of pain, but it produces pain as well as metrorrhagia; the history may be quite like that of ectopic. Physical examination and the finding of a painful tube or tumour at either end of the uterus, together with inspection of the cervix, or, if necessary, curetting, eliminate doubtful points in diagnosis.

(2.) After the Occurrence of Internal Haemorrhage.

In attempting to differentiate between cases of ectopic gestation with internal haemorrhage and the other conditions for which it may be mistaken I will classify clinically and divide them into the following groups: (1.) Where the woman is seized suddenly with abdominal pain and profound collapse; (2) where the woman advances in her pregnancy to the later months; (3) where the woman suffers from a pelvic haematocele. I think this about the most satisfactory way to arrange the cases, as otherwise one is apt to get overlapping in the different groups.

(1.) *Where the Woman is seized suddenly with Abdominal Pain and Profound Collapse.*—These cases are by no means common. The tube usually ruptures between the sixth and the tenth week, but may do so much earlier. The history may show that one period has been missed, but this is not always so. We may meet with this accident in a patient who has had no signs or symptoms of pregnancy. There may have been no attacks of pain or no discharge. On the other hand, one may get a history suggestive of ectopic pregnancy. On being called to a case of this kind, one sees the patient collapsed and blanched, sighing respiration, restlessness, and other signs of air-hunger, and rapid thready pulse. On vaginal examination nothing much may be made out. Later on the free blood in the abdominal cavity collects in the lower abdomen, and may be felt as an effusion in Douglas's pouch. The ruptured tube, however, is soft and collapsed. A case of this sort may be mistaken for—(*a*) ruptured gastric or duodenal ulcer; (*b*) fulminating appendicitis; (*c*) torsion of a pedunculated tumour; (*d*) acute perforation of the gall-bladder; (*e*) ureteral calculus. Two of the above conditions are rare, but, as the mistake has happened, I have included them.

(*a*.) In *ruptured gastric and duodenal ulcer* there will be a history of stomach trouble, probably of long duration. The pain is usually referred to the whole abdomen at first. Within two or three hours, in duodenal ulcer, the pain becomes more localized in the right side. The sensitiveness and rigidity are excessive there. In gastric ulcer the greatest pain is over the point of perforation. The rigidity is from the first absolute. No other condition gives rise to such absolute unyielding rigidity. The rigidity is accompanied by retraction of the abdomen. The breathing is of a short jerky character, different from the sighing respiration of a ruptured ectopic cyst. The collapse in ruptured gastric or duodenal ulcer is not so rapid or profound, and when those symptoms pass off there is recovery for a time, followed by an increase in the abdominal symptoms.

(*b*.) *Fulminating Appendicitis.*—In this the pain is usually referred to the right side of the abdomen. In the history one will find that there has been some pain or constipation, and an aperient has practically always been taken. The pain radiates up towards the liver from the right iliac fossa. There is the increased leucocyte count and the absence of anything pointing towards pregnancy. The pulse will be quite different in character from what one gets in ruptured ectopic pregnancy, and the temperature may be raised.

(*c*.) *Torsion of a pedunculated tumour* causes menstruation to be atypical, and produces metrorrhagia. The steady pain, with attacks of excruciating colic, the soreness of the abdomen, and the metrorrhagia which so often follows the twisting of a pedicle, all look exceedingly like an ectopic gestation. This difficulty is increased if one did not know of the existence of an ovarian cyst prior to the attack. With an ovarian cyst one can feel the tube free of enlargement. There is leucocytosis, a rising temperature, the beginning of peritonitis, a rapid pulse, and the tender mass to be felt apart from the tubes and uterus. The history also is likely to help materially.

(*d*.) *Acute perforation of the gall-bladder* may be mistaken for a ruptured ectopic pregnancy. This is a mistake which should not happen, but which I believe has happened. In acute perforation of the gall-bladder there is usually a history of flatulent dyspepsia extending over a long time, with attacks of severe pain in the region of the gall-bladder, and with shivering-fits of greater or less intensity. The signs of perforation are a sudden pain beneath the right ribs, and collapse. This is usually succeeded by vomiting. After a short time the pain is referred to the umbilicus, and later to the right iliac region. The rigidity is not so marked as in rupture of a gastric or duodenal ulcer.

(*e.*) *Ureteral Calculus.*—This seems somewhat "far-fetched," but I have seen a well-known gynaecologist make the diagnosis of ruptured ectopic gestation when the symptoms were due to ureteral calculus. The patient was about the menopause, with irregular menstruation. She was seized with violent pain low down in the right side, and with collapse. She had a history of colicky pains in the lower abdomen for several days. Bimanual examination was not found satisfactory, on account of pain and rigidity. The cystocope and ureteral catheter cleared up the diagnosis.

(2.) *Where the Woman advances in Pregnancy to the Later Months.*—This is not a very common condition. Here the history is of the greatest importance in differentiating it from *normal pregnancy.* The patient will nearly always tell you that the pregnancy has not been natural—she has at some time during the pregnancy had attacks of pain, faintness, &c. She may seek medical advice on account of the discomfort due to the large sac displacing the structures from their normal position. Abdominal distension is usually more marked on one side than the other, but one sees this often in normal pregnancy, where, as a rule, the uterus is displaced to the right side. A gravid uterus can usually be drawn over to the middle line, while a large gravid sac is nearly always fixed. On vaginal examination the cervix is found to be not so soft as in normal pregnancy, and is often displaced. One might find the uterus as a whole displaced ; but usually the uterus and extra-uterine sac are so adherent that they cannot be distinguished from one another. It is impossible to mistake this mass for a *fibroid,* but the sound will help to differentiate. If the extra-uterine pregnancy goes on to term, and there is "spurious labour," I should say that the diagnosis was very evident. As spurious labour usually coincides with the death of the foetus, the fluid absorbs, the sac shrinks, and the abdominal enlargement decreases. On the other hand, one may see a rapid increase caused by *haemorrhage into the sac* or by *infection.* Infection can usually be differentiated from haemorrhage by the fever which accompanies it, and the general symptoms of sepsis. In some cases, if the fluid is not absorbed in the sac, one can get *ballottement,* or the ability to move the dead child in the sac. Failing that, a skiagram will often show up the bones of the child, and so make diagnosis certain. In some cases the foetus may be long retained after its death, and diagnosis may become very difficult or almost impossible. Sometimes it is fairly easy to make out, as in one case I know of in New Zealand, where the woman has had a dead foetus in the abdominal cavity for fifteen years, and has refused operation.

(3.) *Where the Woman suffers from Pelvic Haematocele.*—In these cases we have an encysted intra-peritoneal bleeding. The signs of internal haemorrhage are usually inconspicuous. A few days after the haemorrhage the patient usually gets an irregular elevation of temperature. This is due partly to the peritonitic reaction around the effused blood, and results in its isolation. It is also partly due to the absorption of fibrin ferments, or the products from the dead blood. The blood flows to the most dependent position—the pouch of Douglas. If the bleeding is very slow it may not reach there, but becomes encysted and retained in contact with the bleeding part—perhaps the abdominal ostium or a tear in some other part of the tube. In intra-ligamentary rupture the blood pours out between the layers of the broad ligament, and forms a *pelvic haematoma.* From the symptoms a diagnosis of tubal pregnancy with internal haemorrhage can generally be made. A *pelvic haematocele* forms a swelling extending upwards, often above the pubes. The hypogastric region is prominent, and pressure causes distinct pain. The swelling is dome-shaped, elastic, and ill-defined. It is usually in the middle line. The percussion note is subresonant. On vaginal examination one finds the uterus and cervix pressed against the symphysis pubis. Sometimes they are lifted up, and may be displaced to one side. Often one finds softening of the cervix. The rest of the pelvis is filled up with an effusion, and the posterior fornix may be bulging downwards. The swelling is elastic, sometimes doughy, and one can frequently feel hard areas due to irregular or incomplete coagulation of the blood. The pelvic mass is continuous with that felt above the pubes. On rectal examination one finds the sacral hollow filled up and the rectum compressed. The most important point is to differentiate this from *retroversion of the gravid uterus.* The history is usually very different. One common point in retroversion of the gravid uterus is retention and incontinence of urine. This is uncommon in haematocele. The discharge of decidua is only present if the case is one of ectopic gestation. Attacks of severe pain are strongly suggestive of haematocele. On vaginal examination, if one can make out the fundus lying in front or to one side of the swelling, then one knows it is not a retroversion of the gravid uterus. The gravid uterus is of more uniform consistence than an haematocele, and it may be felt to undergo intermittent contractions. An *incarcerated ovarian cyst* may be mistaken for an haematocele. The consistence of the cyst is more uniform and more tense or resistant than an haematocele, and its outline is better-defined. Menstruation is unaffected, or, if altered, one would expect menorrhagia. There is no softening of the cervix and no irregular uterine bleeding. Attacks of severe abdominal pain are in favour of haematocele.

Inflammatory (peritonitic) effusions in the pouch of Douglas are distinguished by the history. In pelvic peritonitis fever is an initial symptom, in haematocele it is usually late in coming on. In inflammatory cases the general symptoms do not suggest haemorrhage; no pallor, and the pulse, although quick, is of high tension. The local tenderness in pelvic peritonitis is much greater than in haematocele.

A *haematoma of the broad ligament* is best distinguished from inflammatory (cellulitis) effusion in the same manner by the history.

I have now given a brief outline of some of the main points in the differential diagnosis of ectopic gestation. I am well aware that there are many other conditions which might have been mentioned, but time will not allow. You will also notice that I have not mentioned the use of Abderhalden's method. In the early cases, which have to be operated upon in the first six or eight weeks, one could not expect to get any very reliable information from this method. In the later cases of secondary abdominal pregnancy the method would no doubt be of great value; but on this point I do not know of enough cases having been collected to speak definitely. Of six cases of ectopic gestation reported in the *Zentralblatt für Gynäkologie* within the last few months, four gave a negative reaction, which thus shows an error of over 66 per cent. I have no doubt that improvements in the working of this method will some day be able to show better results, and will prove of inestimable value in the differential diagnosis of ectopic gestation.

POLYPOID DECIDUAL ENDOMETRITIS IN THE PERTH HOSPITAL.

By Arthur J. Nyulasy, M.R.C.S. (Eng.),

Gynaecologist to the Perth Hospital.

Knowledge which tends to diminish the morbidity or the mortality from childbirth or from abortion, and which is thus intimately bound up with the well-being of womankind, and therefore of the whole race, cannot be regarded otherwise than as of the highest practical importance.

These remarks appear to me to apply with particular force to the condition, with which I now propose to deal, as I have encountered it in the Perth Hospital. In illustration let me recall a private case I saw in Perth two years ago. This patient, the 23-year-old wife of a man who had led a rather wild life, had been confined ten days earlier, and was now in a condition of profound sepsis, with blood-tinged unpleasant vaginal discharge. The attending physician assured me that the placenta had come away absolutely perfect, and that no membrane had been left behind. On passing my finger into the uterus I felt tough, polypoid, somewhat flattened masses on the placental site. These I curetted away, and explained that this was a case of polypoid decidual endometritis. The attending physician had never heard of such a condition, a fact very unfortunate for his young patient, as she succumbed a few days after I saw her. This case is but a type of similar cases that have come within my experience.

When in the year 1861 Virchow described for the first time, and purely from naked-eye observation, a single case of what he called "polypoid decidual endometritis," the condition was naturally thought to be one of extreme rarity. Recent investigations, however, and notably those of Ahlfield and of Frank Nyulasy, of Melbourne, have demonstrated beyond doubt that far from being of extreme rarity, polypoid decidual endometritis is relatively common, and accounts for quite a high proportion of cases of adherent placenta, and in that regard alone must be an efficient cause of much morbidity and of many deaths following on childbirth and abortion. The relative frequency of polypoid decidual endometritis is not very difficult to understand when we bear in mind that of all chronic infections syphilis is by far the most common, and that syphilis appears to be of prime importance in the causation of polypoid decidual endometritis. In one of the most typical instances in my experience (seen with Dr. Hicks, of Guildford) a very densely and universally adherent placenta was removed with the polypoid decidua some hours after labour. There was a history of syphilis in the husband dating back somewhat over a year, although the wife had shown no obvious external evidence of infection. The speciment sent to Dr. Frank Nyulasy was such a striking example of syphilitic polypoid decidual endometritis that the incidental microphotographs were embodied in his thesis. In this connection the remarkable prevalence of syphilis, in Victoria at least, is amply demonstrated by the careful observations of Professor Sir Harry Allen in the Melbourne Hospital. He took two series of 100 consecutive autopsies, with an interval of four years between, and found a striking similarity in the conclusions from the two series. Thus, in 1904 there were thirty-four cases of certain syphilis, nineteen cases of doubtful, and one of suspicious syphilis; while in 1908 there were thirty-two cases of certain syphilis and thirty more or less doubtful. Professor Allen points out that these figures, of course, are not to be taken as indicative of the prevalence of syphilis in the whole hospital population, and still less of the general population. All the same, they are startling evidence of the prevalence of a great national scourge, and more than ever call out for legislative enactments to limit its ravages. But in all matters connected with syphilis Professor Allen is *facile princeps* in Australia, and it is therefore interesting to find that in the University Pathological Museum he has a really splendid collection of uteri affected with polypoid decidual endometritis (the women having died of sepsis), and that he is of opinion that in a large proportion of the cases there was an underlying element of syphilis. Some few years ago Professor Allen had provisionally labelled these specimens as instances of "lumpy placental mark," but on a further study, and on examination of Dr. Frank Nyulasy's sections, they were classified as examples of polypoid decidual endometritis.

What, then, is polypoid decidual endometritis? It is a disease of the decidua which may or may not lead to abortion, many of the most typical cases being met with after full-time labour. It mainly affects the placental site, although, as Professor Allen points out, it may extend down to the cervix uteri. It presents itself in the form of smaller or larger, very tough, polypoid masses, often very difficult of removal from the uterus. A striking and most important feature is the marked tendency of the polypoid masses to undergo septic changes: indeed, Dr. Frank Nyulasy states that all such cases will within some days present evidence of infection if the masses are unremoved.

As to causation, it "is a result of pre-existing chronic endometritis beginning prior to or coincidently with pregnancy, and continued into the puerperium, during which acute processes are grafted upon the chronic condition in consequence of septic infection." Although syphilis is a very important etiological factor, it is quite possible that other organisms may also be responsible for the condition. Professor Allen thinks it likely that the essential features of origin are—(1) a low-grade irritant; (2) acting over a long period.

It is thus not improbable that the *Gonococcus* or the common pyogenic *Cocci* may be set down as causes. In the Perth Hospital it was not common to obtain an admission of syphilis, although in a high percentage of sections the microscopic features were indistinguishable from those with a definitely syphilitic history.

It is important to bear in mind that polypoid decidual endometritis is neither a hypertrophy nor an adenomatous condition. The adenomatous theory was adopted because of the apparent presence of numerous "glands." F. Nyulasy has shown that many of the "vessels," and practically all the "glands," are merely venous spaces from which the blood has run out. So, too, the theory of "hypertrophy," strictly so called, has been shown to be without adequate foundation.

The symptoms may be abortion, adherent placenta, or sepsis after the full-time placenta has come away perfectly "clean." This latter fact is of the highest importance, as in such circumstances a patient may die of blood-poisoning just as effectively as if a large piece of placenta had been left behind.

In the Perth Hospital I have dealt with some two hundred cases, mainly of abortion, but partly of labour, admitted with sepsis or haemorrhage. As to the percentage of polypoid cases, Dr. Gerard, my house surgeon a few years ago, estimated that out of a series of about a hundred cases there were 50 or 60 per cent. with adherent placenta. A high proportion of the curette specimens microscopically examined proved to be instances of polypoid decidual endometritis. This suggests either that syphilitic infection is exceptionally common in Perth, or that other organisms operate with much frequency. Whatever the explanation, the percentage of cases of polypoid decidual endometritis (clinically and microscopically) was exceptionally high, for Dr. Frank Nyulasy gives a proportion of only 3 to 5 per cent. of all pregnancies. But even these low figures indicate that it is a comparatively common complication of pregnancy. I would here point out that my series consisted only of cases admitted to hospital either for sepsis or for haemorrhage, or for both.

The treatment adopted in the Perth Hospital cases was prompt removal of the polypoid decidua with a curette. I have invariably used the sharpest possible curette, on the ground of its greater safety and greater efficiency. After curettage and douching, I have in some cases packed the uterus with iodoform gauze. In connection with curettage, it is to be noted that, on account of the enormous venous spaces in the polypoid decidua, there may be severe haemorrhage. Indeed, in occasional cases I have felt constrained, before the curettage was complete, to pack the uterus with iodoform gauze, and subject the patient to a second sitting a couple of days later. Apart from haemorrhage, however, more than one application of the curette is essential in odd cases. Thus, in a five-months abortion I found a universally adherent placenta very difficult to remove, my sharpest curette proving only partially effective. At a second sitting a few days later, in order to facilitate removal of the polypoid decidua remaining, I did an anterin vaginal metrotomy, and even then was ultimately forced to assist the sharp curette with forceps to positively tear away what still remained. Until a few years ago I was in the habit of referring to such cases as instances of "leathery placenta." Thus, in a case of perforated uterus the result of criminal abortion, and which had been curetted, I stated in an earlier paper that "at autopsy, a layer of fibrous leathery placenta was still ahderent. What remained could only be peeled off with difficulty, even with the uterus laid open on the table." The microscope has invariably proved these cases of "leathery placenta" to be instances of polypoid decidual endometritis.

Proceeding on the lines indicated, I have lost no case of polypoid decidual endometritis in the Perth Hospital (or in private practice), unless pronounced septicaemia was already present and the death-warrant of the patient practically signed before coming under observation.

THE RELATION OF INTERNAL SECRETIONS TO THE ACTIVITY OF THE MAMMARY GLAND.

By Kenneth Mackenzie, M.D., M.Ch. (Edin.), F.R.C.S. (Eng.).

The mammary gland, which is rudimentary in early life, advances a stage with the attainment of sexual maturity. The occurrence of pregnancy induces marked hypertrophic changes, and parturition is followed by secretory activity. The stimuli which determine these changes may reach the gland by one or other of two routes—by the nervous connections and by the blood-stream. A case reported by Routh(1) in 1897 showed that the changes are independent of any reflex nervous stimulus from the generative organs. A pregnant woman met with an accident, which destroyed the spinal cord in the lower dorsal region. Mammary hypertrophy continued, and parturition was followed by normal lactation.

Ribbert(2) showed independence of direct nerve-impulses by the conclusive experiment of transplanting the gland of a guinea-pig from its original site to the regions of the ear, where it functionated normally. There is much evidence to show that stimuli reach the gland through the medium of the blood-stream, and that these stimuli are of a chemical nature, internal secretions or hormones, produced in various tissues of the body.

The changes occurring at puberty are in all probability due to an internal secretion of the maturing ovary, probably of the corpus luteum. Fellner(3) states that the injection into immature rabbits and guinea-pigs of extract of ovaries containing corpora lutea is followed by hypertrophy of the mammary glands to several times their previous size, whereas the extract of ovaries in which no corpora lutea are present is inactive. Marshall and Jolly(4), from a series of experiments, conclude that the corpus luteum provides a secretion whose function is essential for the changes taking place during the attachment and development of the embryo in the first stages of pregnancy. O'Donoghue(5) and others hold that in addition to these functions the luteal secretion acts as the main stimulus to the mammary growth of pregnancy. This view is supported by the experiments of Ancel and Bonin(6), who find that destruction of the corpora lutea in pregnant rabbits arrests the development of the mammary glands. Starling and Lane-Claypon(7), on the other hand, hold that this development is caused by a specific hormone produced in the foetal tissues. This they demonstrated in a most interesting series of experiments, in which, by the continued injection of extract of foetal rabbits, they brought about in virgin rabbits a mammary growth similar to that of pregnancy. Their observations have been confirmed by Foa(8) and by Biedl and Konigstein(9).

Having discussed the views held relative to mammary growth, let us now consider the relation of internal secretions to the active function of the glands in the production of milk. Various observers(10, 11, 12) have stated that extracts of placenta and of foetus stimulate lactation, but their methods of estimating were crude. The first to show conclusively that animal extracts containing hormones directly stimulate the mammary secretion was Ott(13), of Philadelphia, who made the brief statement, in a slip inserted into a pamphlet on "Internal Secretions," that "infundibular is a rapid and powerful galactagogue." This formed the starting-point of an investigation carried on by Sir E. A. Schafer and myself, in the course of which we confirmed Ott's statement, and discovered that extract of corpus luteum has a similar though less powerful effect. This observation Ott(14) also made, and published in a paper which came into our hands later. The results of our investigations were communicated to the Royal Society(15).

Following upon this I proceeded with a further series of experiments. The first method used was that of inserting fine canulae into the milk-ducts, but this was found unsatisfactory, and the following method was adopted: The animal (cats were used almost exclusively) was anaesthetized by subcutaneous injection of chloral hydrate. A transverse incision was made across one pair of mammae, and the gland-tissue cut into freely just behind the nipple, which was itself undercut, so that the main milk-ducts were severed.

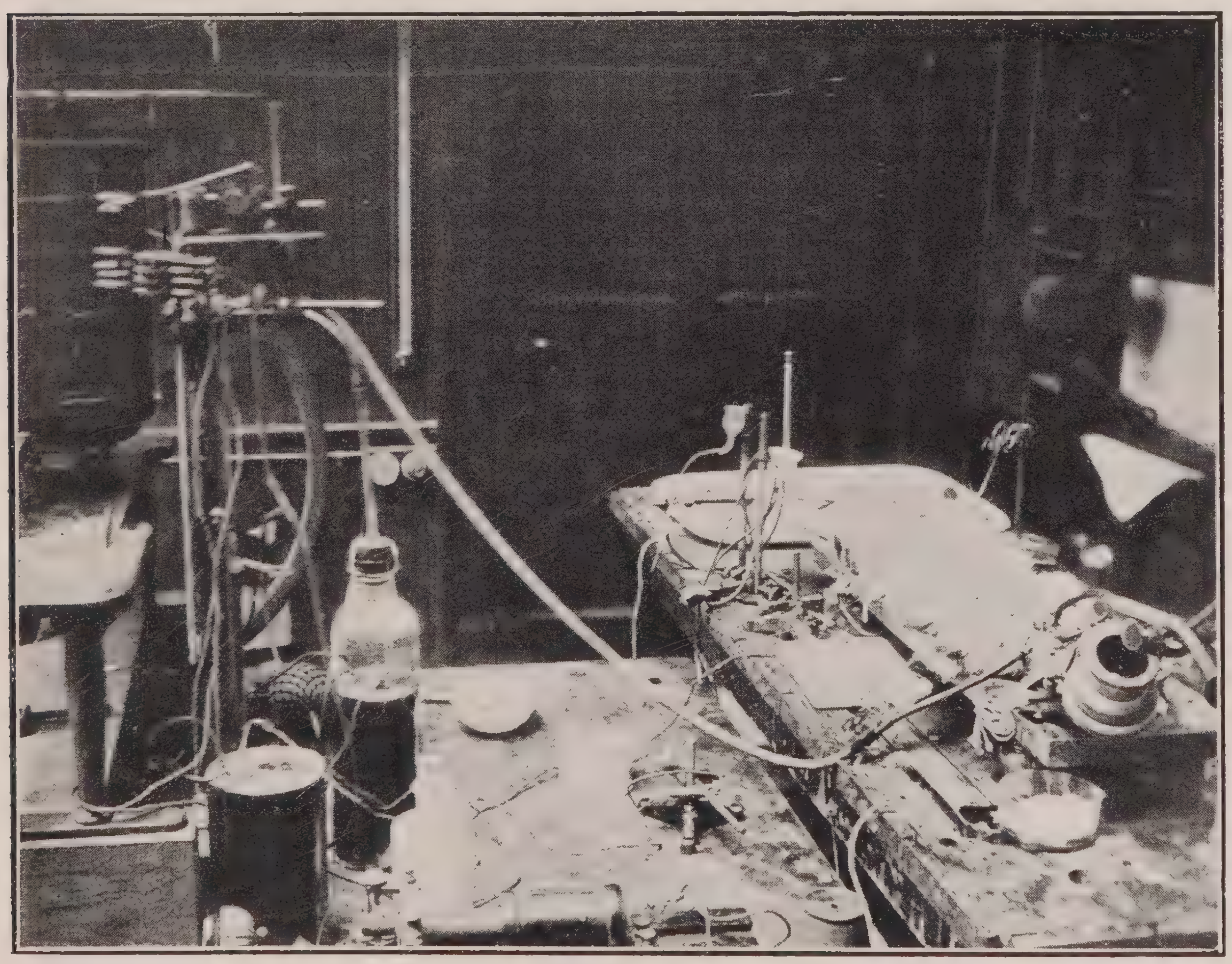

FIG. 1.

In the incision a strand of absorbent wick was laid, and was carried over the side of the animal so that drops from it might fall upon an electro-magnetic recorder registering on the smoked paper of a kymograph. A blood-pressure manometer is attached to the carotid artery, and the external jugular vein is bared for purposes of injection.

The extracts used in the experiments were prepared with Singer's saline solution, either from fresh or dried organs. The extracts were boiled and filtered previous to injection.

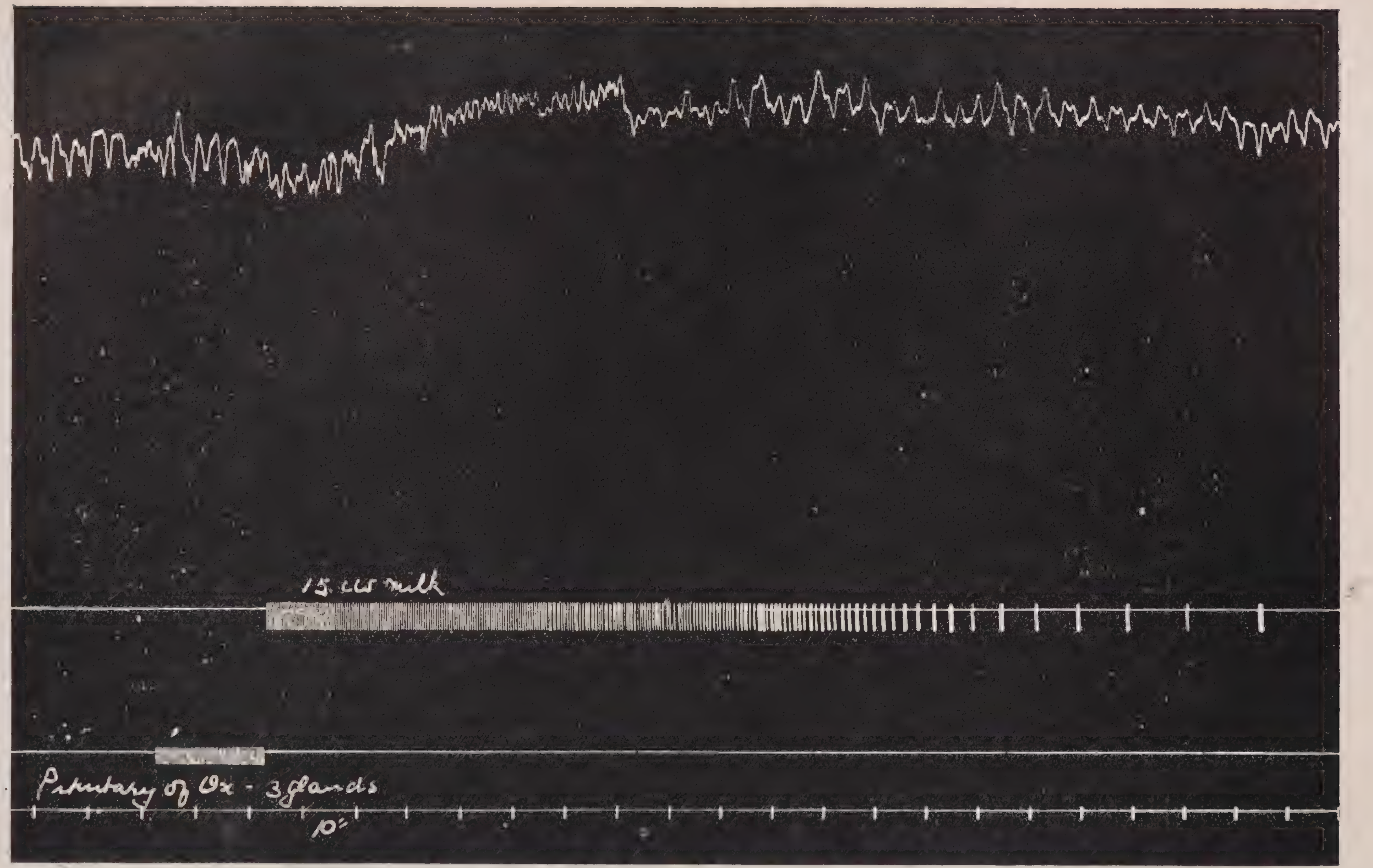

FIG. 2.—The action of a saline extract of the posterior lobe of the pituitary body of the ox. A freely lactating cat was used. Twenty minutes previously an extract of the pituitary of the bird had been given and had caused a free flow of milk.

By this method it was found that an increased flow of milk followed the injection of the extracts of five organs, viz.: (1) Pituitary body, (2) pineal body, (3) corpus luteum, (4) involuting uterus, (5) mammary gland. The first three of these extracts were invariable in their effects; the last two were variable. No other extract on any occasion caused increased secretion.

The action of these extracts will now be described in greater detail.

(I.) *Pituitary Body.*

The anterior and posterior lobes of the gland were investigated separately. The galactagogue substance was found to be contained in the posterior lobe, the anterior lobe being quite inactive. The hormone is not destroyed by drying, nor by repeated boiling. It is readily soluble in water and weak saline solutions, but is insoluble in alcohol.

The tracing on the facing page illustrates well the potent action of the extract. A dose equal to the active principle of three pituitary glands was injected intravenously. At the commencement of the record scarcely a drop of milk was falling. Immediately following injection a copious outpouring began, and 15 c.c. of milk were collected within five minutes. This injection was followed by the usual pressor effect on the vascular apparatus. Three subsequent doses at half-hourly intervals produced similar but less marked effects. The third injection I show, for it brings out the point that secretion occurs in the presence of the depressor vascular action constantly associated with a second dose of pituitary extract. This result is analogous to that described by Magnus and Schafer(16) and by Schafer and Herring(17) in the kidney, a

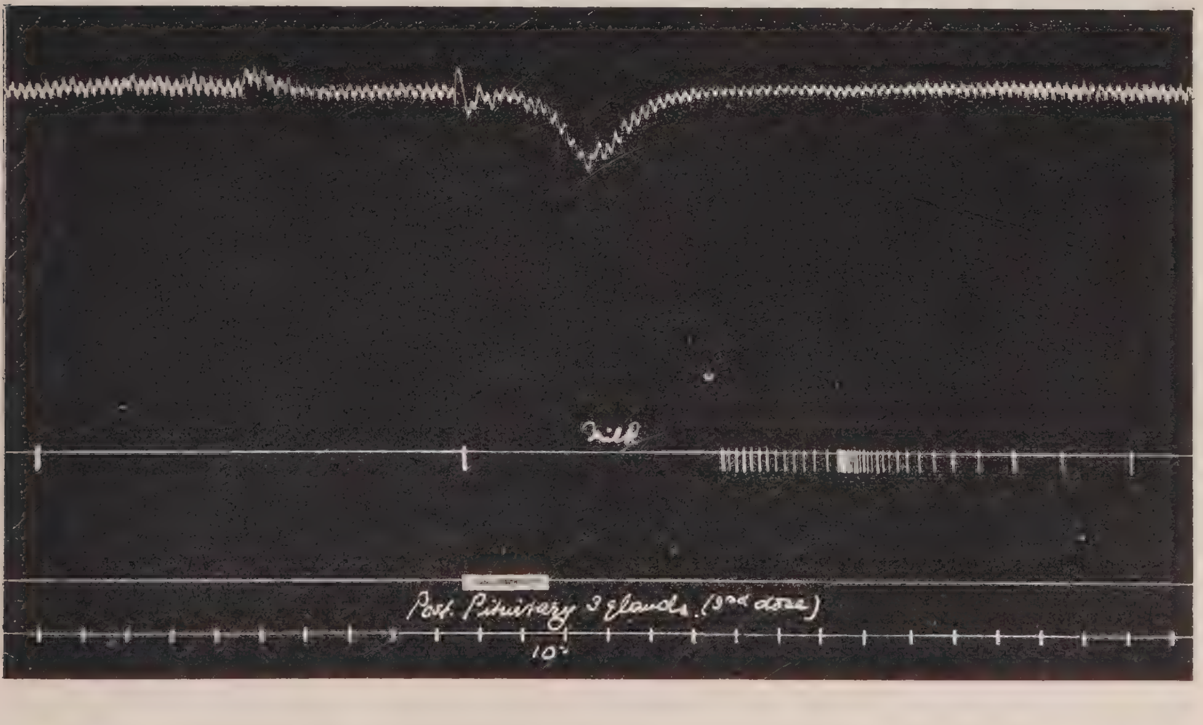

FIG. 3.—From the same animal later. Another dose of pituitary extract had been given twenty minutes after the dose, the result of which is recorded in fig. 1. This tracing represents the result of yet another dose, which followed twenty minutes afterwards. Notice the fall in blood-pressure caused by the repeat dose of pituitary extract.

marked diuretic action with increase of kidney-volume, independent of general vascular effects—*i.e.*, rise or fall of blood-pressure, and assumed to be a result of direct stimulation of the secretory renal epithelium.

The galactagogue substance is present in the pituitary body not only of lactating females, but also of non-lactating females and of males. A comparison was attempted between the extracts in the lactating and in the non-lactating, but no definite result was obtained. Comte(18) has shown that there is, during pregnancy, an hypertrophy of the pituitary gland associated with well-marked histological changes. In the course of my experiments I examined the glands in many cats, and found a constant increase in weight in lactating animals over non-pregnant non-lactating animals to the extent of at least 15 per cent.

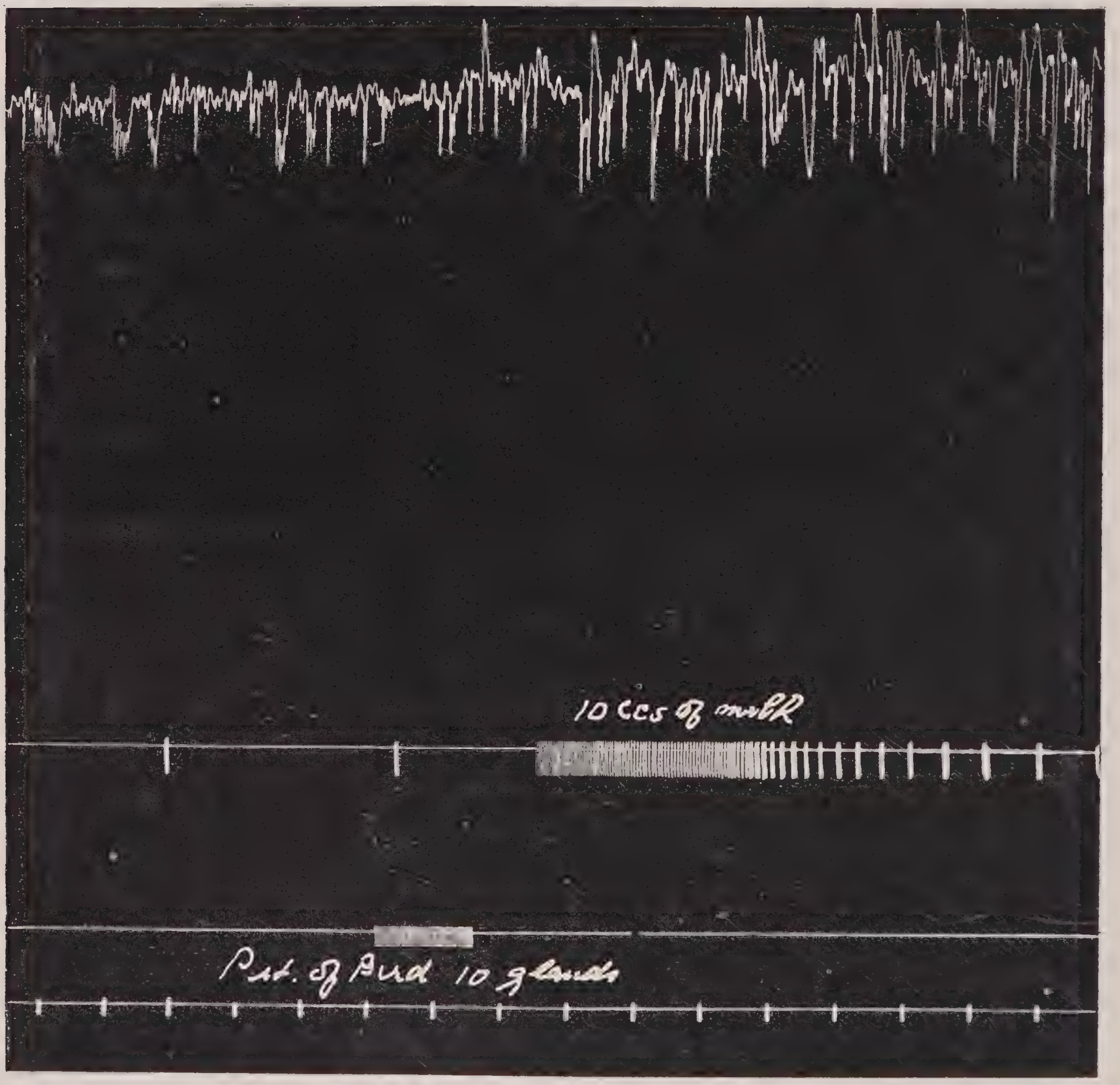

FIG. 4.—Action of a saline extract of the pituitary body of the fowl.

The galactagogue substance is not confined to mammals, but is present also in the pituitary glands of birds and of fishes.

I show a tracing above illustrating the action of a dose of pituitary extract from the domestic fowl.

Herring, of St. Andrews University(19), has particularly studied the action of the pituitary body of the skate and the cod. These extracts produce no effect upon blood-pressure or renal activity, but have a well-marked galactagogue effect, and it is therefore assumed that the mammary stimulant is a substance *sui generis*.

It has been suggested that the increased milk-flow is due to stimulation of plain muscular tissue by the extract, causing contraction and the expression of milk previously accumulated in the lactiferous ducts. With this view I disagree, for the following reasons: No muscular tissue has been demonstrated in the walls of the ducts except where they traverse the nipple, and that region was cut off in my experiments. A second dose fails to stimulate the muscular coat of the arteries to contraction, but is potent to increase milk-flow. The action of the extract on renal epithelium is a direct one, and an analogy can readily be drawn in the case of the mammary gland. Substances which it is unreasonable to think paralyse muscle inhibit the galactagogue action of pituitary extract.

The clinical and commercial aspects of the matter are now to be considered. I have had but few opportunities of making observations on the human female. In one case I obtained a distinctly positive action. This was in a woman in the tenth month of lactation, and suffering from a mammary abscess. Observations were made upon the healthy breast. Twelve hours after admission to hospital the breast was emptied by a suction-pump and 60 c.c. milk withdrawn. A dose of 1 c.c. of pituitary extract was given intramuscularly, and an hour later the breast was again drawn and 100 c.c. of milk obtained. Unfortunately I had not an opportunity of repeating this experiment.

Sir Edward Schafer(20) has this year published some observations. In the case he reports the injection of pituitrin was followed by a tingling sensation in the breasts, and at the feeding-time following the injection there was an increase in milk, but this was followed by a longer than usual time before the next feeding, and it was concluded that the total quantity was not increased by the injections. An experiment with the breast-pump yielded a result similar to that in the case that I observed.

Heaney(21), in a recent paper, concludes that no definite galactagogue effect is obtained by the use of pituitrin. The subject has, however, been but inadequately investigated on the clinical side, and further observations are needed.

The commercial side of the subject has been studied by Gavin(22), whose conclusions are that under the conditions of ordinary farm practice no commercial benefit arises from the administration to dairy cows of these glandular extracts, neither the total quantity nor the quality of the milk being affected. Hammond(23) has recently published the results of numerous experiments carried out at the School of Agriculture, Cambridge. He states that the daily yield of milk is slightly increased, and that the milk obtained contains a higher percentage of fat, but is otherwise normal in composition. This percentage, however, falls in subsequent milkings. He also confirms the view that I have expressed—that the action of the extract is directly upon the glandular epithelium, not upon the muscular tissue.

Let us now consider briefly the other galactagogue extracts.

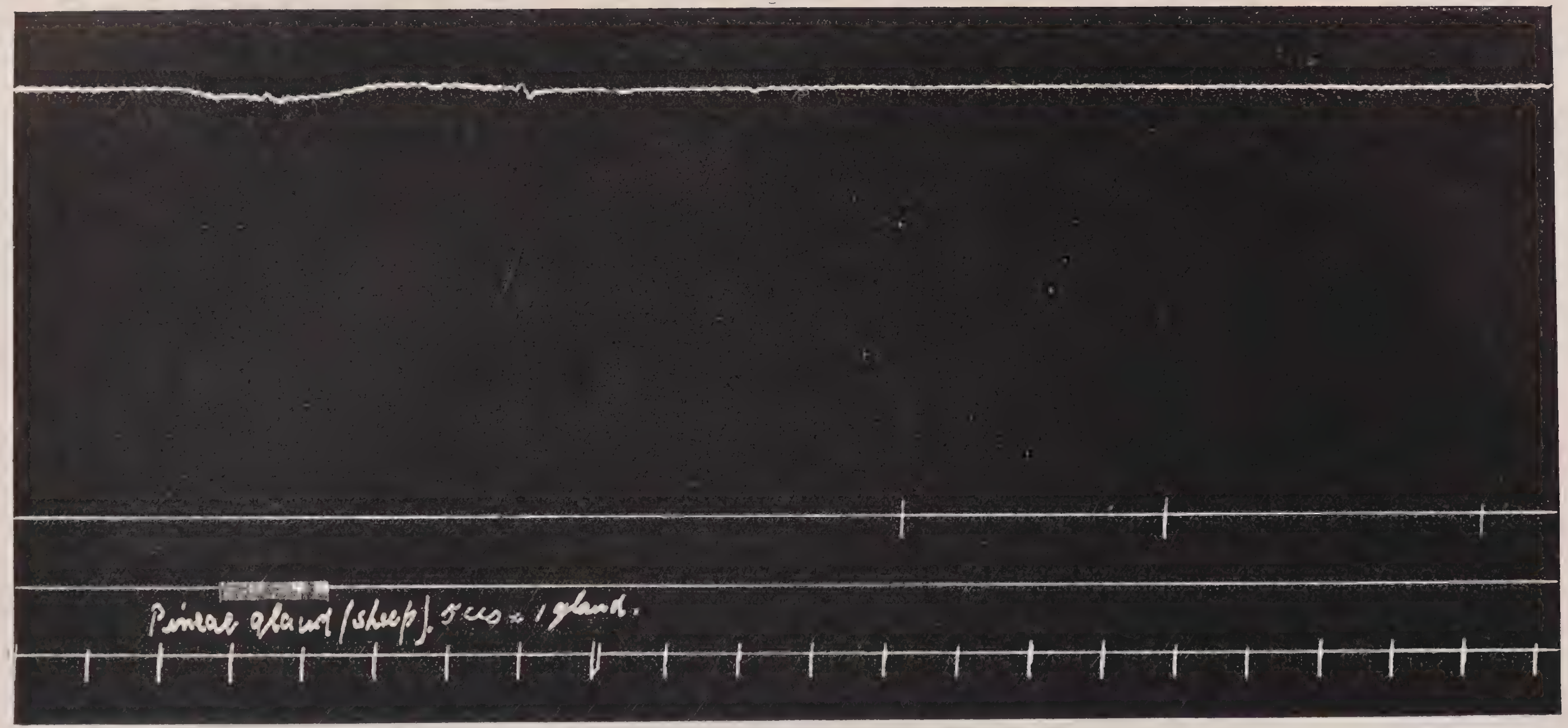

FIG. 5.—Action of extract of pineal body. A poorly lactating cat was employed. Only two drops had fallen in the previous fifteen minutes.

(2.) *Pineal Body.*

Injection of an extract of this organ produces a definite though slight galactagogue action.

The tracing on the facing page shows it. The mammae in this animal were but poorly developed. No drop of milk had fallen for fifteen minutes before the injection. Following it seven drops fell within ten minutes, and no other drops in the next fifteen minutes. This result was confirmed in other experiments. The action, which is also mentioned by Ott and Scott, is an unexpected one, for no activity had previously been attributed to extracts of the pineal body, the organ being considered merely as a functionless vestigial structure. The pituitary body discharges its secretion into the cerebro-spinal fluid, and it was thought possible that the action might be explained by the contact of the pineal body with pituitary secretion. Injections of cerebro-spinal fluid and of extract of brain-substance were, however, without effect.

(3.) *Corpus Luteum.*

Injection of saline extracts of corpus luteum causes a well-marked galactagogue action, less powerful, however, than that caused by pituitary extract.

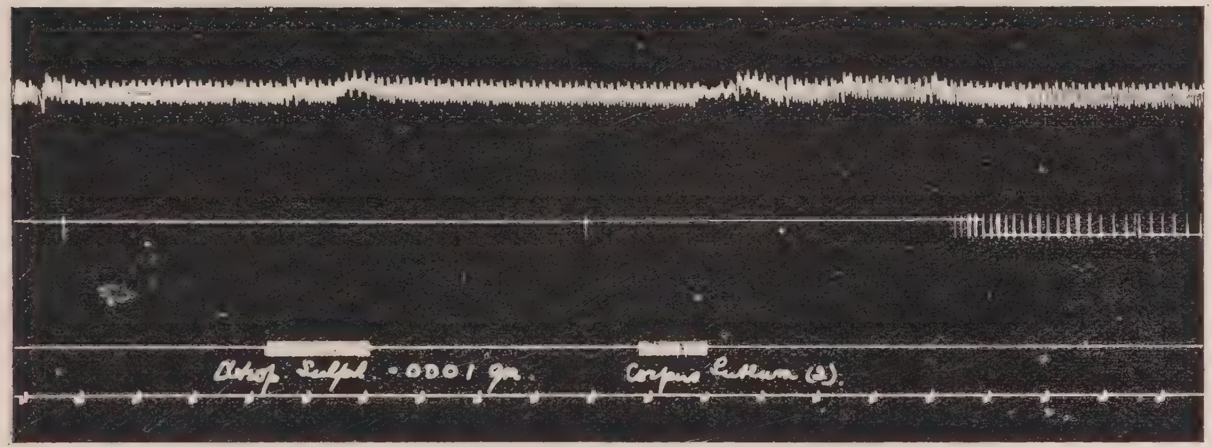

Fig. 6.—Absence of inhibitory action of atropine. This experiment was made on the same animal as that used for the injection the result of which is shown in fig. 5. This was the fourth dose of luteal extract given; each one was effective.

Repeated doses at half-hourly intervals give practically equal effects. The extract is active, whether prepared from the glands of lactating or of non-lactating animals. The corpus luteum of pregnancy continues undiminished in size after parturition, for a time not definitely determined. B. P. Watson(24), of Edinburgh, has examined them in rats, and found no diminution up to the twenty-third day, and I have made similar observations in cats up to a month after parturition.

Extract of ovarian tissue not containing luteal substance is entirely inactive as regards the mammary gland.

(4.) *Involuting Uterus.*

The discovery of the possession of a galactagogue substance by the involuting uterus was one that occasioned no surprise, for it was easy to picture the production of a stimulant hormone in this organ, the retrogressive changes in which are so intimately associated with the onset of lactation.

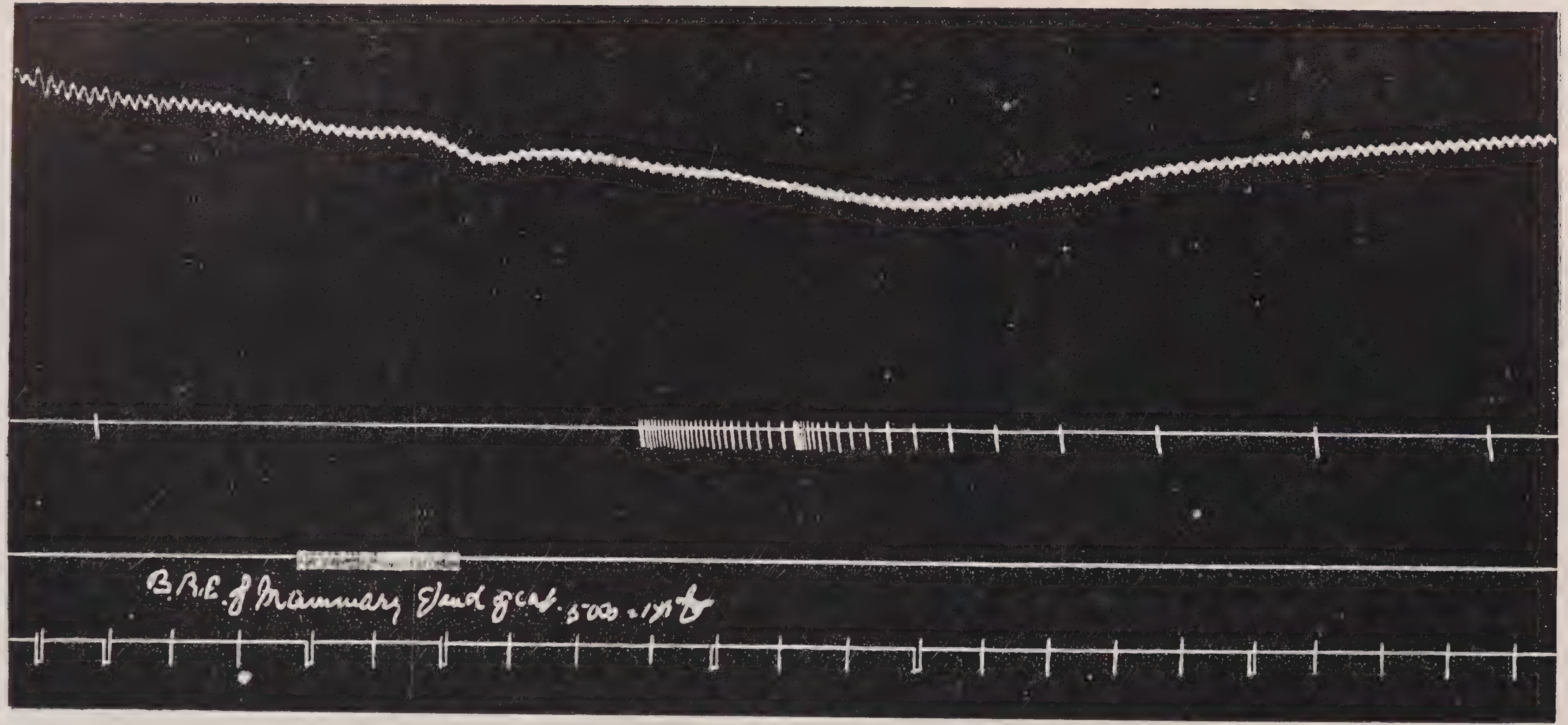

FIG. 7.—Action of saline extract of the mammary gland of a lactating cat.

Fig. 7 (on facing page) shows the result of an injection of this extract. The action is very well marked. The tracing with a second injection thirty minutes later is shown in fig. 8.

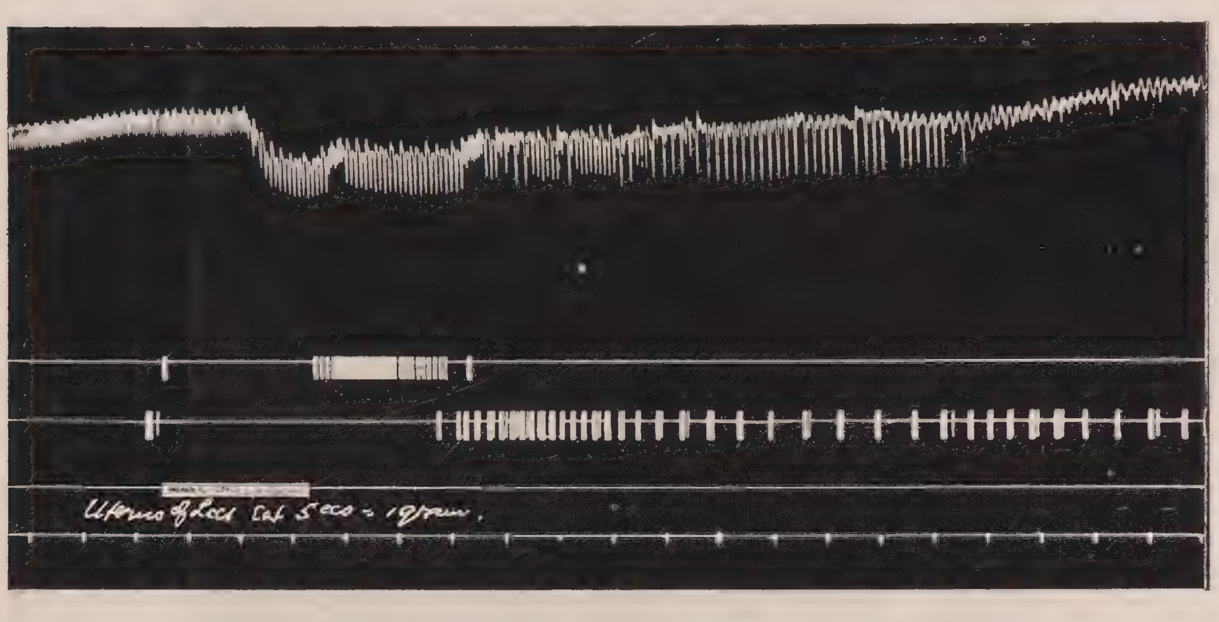

FIG. 8.—Action of a saline extract of the involuting uterus of cat. The upper drop-record is from a hollow needle inserted into a mamma, the lower from a wick leading from two mammae. Extract of thymus gland had been given ten minutes before, without producing any effect.

Injections of several non-galactagogue substances had been made in the interval. The amount obtained after the second dose was 4·5 c.c.

The extracts used were from uteri within ten days after parturition. I have not attempted to determine for how long the hormone remains in the uterus. It is, however, absent from the pregnant uterus, and from the uterus of the non-lactating animal.

(5.) *Mammary Gland.*

In one of two experiments an extract of lactating mammary gland acted as a galactagogue. In others it was without effect.

Fig. 9 (on the following page) shows the results of the injection of a saline extract of 1 gramme of mammary tissue—a flow of fifty drops of milk occurring within four minutes of the injection. A dose of luteal extract given thirty minutes previously produced but seven drops.

The electrical condition of the mammary gland during activity may here be briefly referred to. The investigation was carried out by Sir E. A. Schafer(25) by means of that most delicate instrument Guithoven's string galvanometer, the movements of the needle of which are recorded on a photographic plate. Galactagogue extracts were injected, and with the commencement of secretion a current of action was found immediately to be set up in the gland. This current may be in a single phase from the deeper parts to the surface, or it may be diphasic, a reverse current replacing the primary outward current.

Animal extracts possessing an inhibitory influence on mammary secretion nay next be considered. (Sir E. A. Schafer has recently suggested hat the name "chalone" should be applied to internal secretions ossessed of inhibitory powers). Mammary secretion does not occur

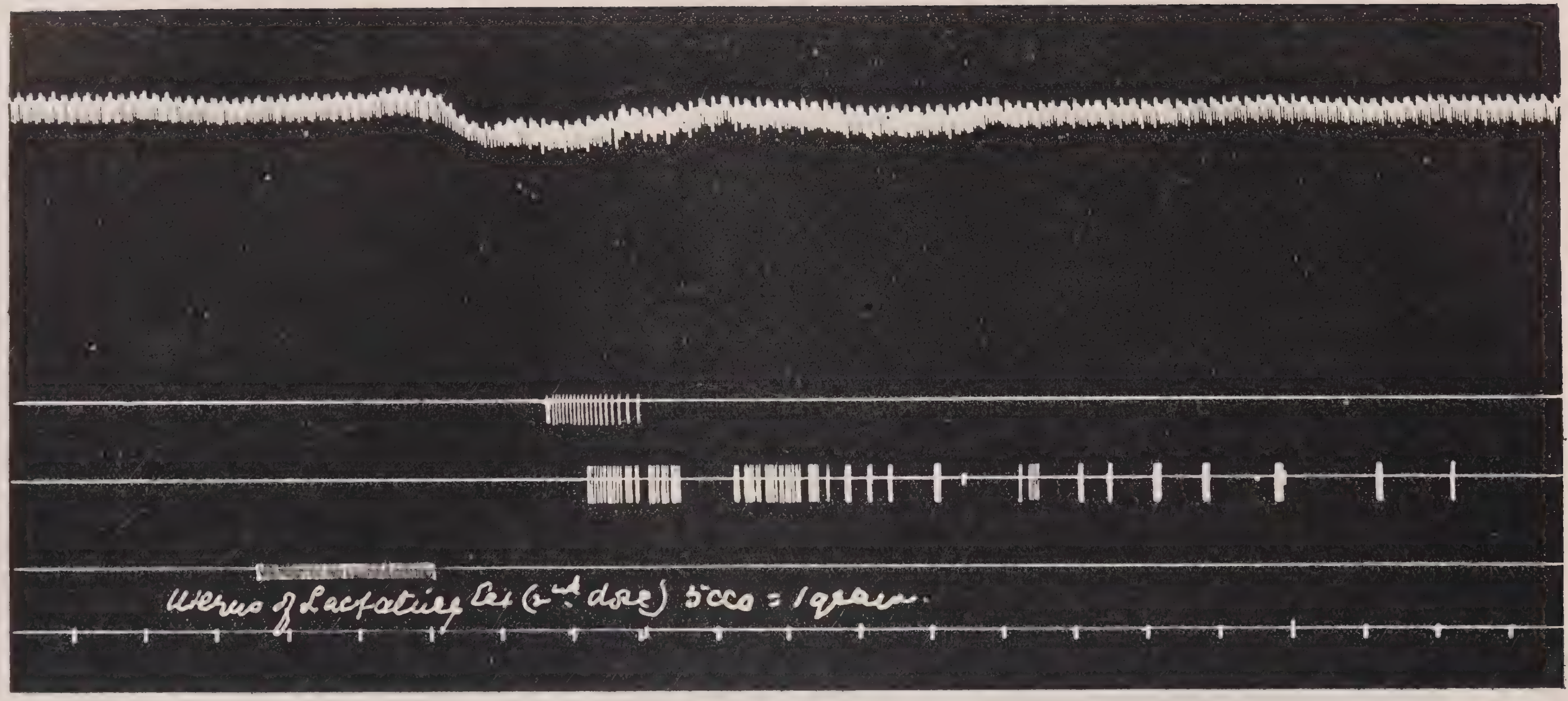

FIG. 9.—Effect of a second dose of extract of involuting uterus given thirty minutes after the action recorded in fig. 8.

while the foetus is in utero, but if it is removed at any time after the third month a secretion from the breasts follows. The possibility that the commencement of the flow is determined by the removal of the source of inhibitory substances led me to perform experiments with the view of testing the effect of the injection of the extract of the uterine contents (foetus and placenta) upon the action of known galactagogue extracts. The results show that extracts of both foetus and placenta are possessed of a marked inhibitory power on milk-secretion.

From this experiment I think that it may be justly concluded that foetal extract possesses a definite inhibitory action upon mammary activity, and that this action is enerted throughout the later months (after the third) of pregnancy, coincident with the stimulating action upon the growth of the glands.

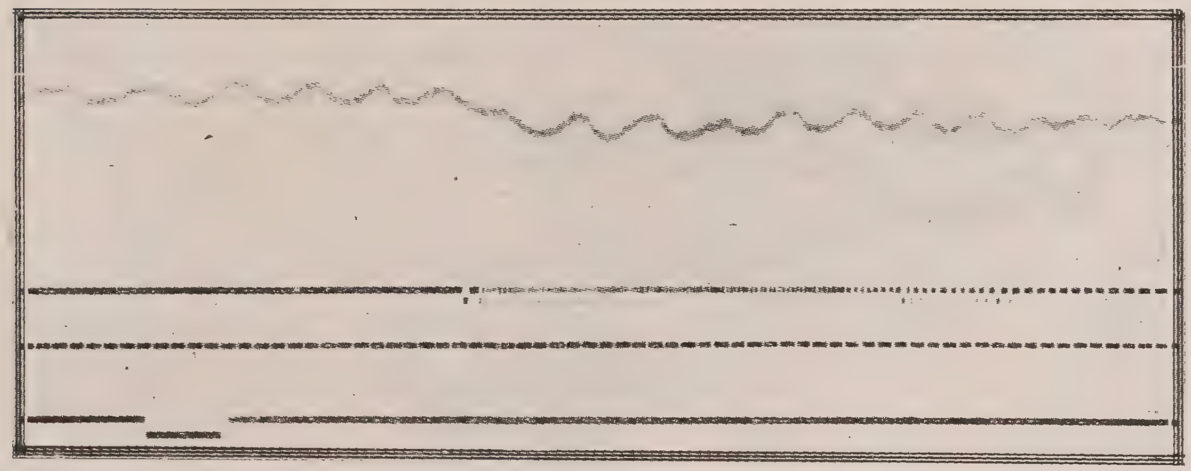

FIG. 10.—Shows a tracing of a monophasic current occurring during the free secretion of milk following an injection of pituitary extract.

D'Errico(26) states that he has obtained an inhibitory effect on injection of the serum of a pregnant animal.

An action similar to that of foetal extract was obtained with placental extract. It cannot, however, be definitely stated that the placenta itself manufactures a specific inhibitory hormone. I incline to think that the action is due to a quantity of the foetal hormone in circulation in the placenta.

The blood-serum of a pregnant animal was also tested for the presence of the chalone, but without definite result. It is, of course, unlikely that there is any great quantity of an internal secretion present in the circulation at one time. Probably it is passed constantly in small quantity from its source of manufacture into the blood-stream.

Negative Results.

In the course of these experiments extract of many other organs were injected, and were found to be without action upon milk-secretion. They include extracts of thyroid gland, thymus, suprarenal capsule, spleen, ovary minus corpus luteum, testis, liver, pancreas, duodenum, kidney, and muscle. A galactagogue action is attributed by Ott and Scott to thymus extract, but this I was unable to confirm. It was tried in many experiments, but uniformly failed to cause secretion, although the injection of pituitary extract shortly afterwards caused free secretion.

Action of Drugs.

Eserine, nicotine, caffeine, and pilocarpine were tested as galactagogues, but all were without action. The injection of the last named was followed by copious salivation, and the pads of the animals became moistened, but no drop of milk was secreted.

Atropine is generally supposed to be possessed of an anti-galactagogue action in virtue of its power of paralysing the terminations of secretory nerves (26, 27). In my experiments this was shown not to be present. Successive doses of galactagogue substances were given, as in the experiment mentioned above, to test inhibition. Those injections which were preceded by doses of atropine were as active as the controls.

Influence of Nerves.

Varying statements have been made by successive observers(28, 29, 30) as to the influence which the nerves possess over mammary function. I found that neither stimulation nor section of the mammary nerves had any effect in increasing milk-flow, or in diminishing the action of galactagogue extracts. Stimulation of the skin in the region of the nipple also gave negative results. It would appear that the mammary gland is little if at all under the direct influence of the nervous system. This view is strengthened by the results obtained with atropine. The nervous influence on milk-secretion, which is well known to occur, is therefore probably an indirect one operating not upon the mammary gland through its nerves, but upon the organs which supply galactagogues to the blood.

Summary.

1. The mammary gland is not, as regards its secretory activity, under the direct influence of the nervous system.
2. Hormones which stimulate the gland and also those which inhibit its activity reach it by means of the blood-stream.
3. Stimulating hormones are produced in: (*a*) Pituitary body, (*b*) pineal body, (*c*) corpus luteum, (*d*) involuting uterus, and (*e*) mammary gland itself.
4. The pituitary hormone is the most powerful stimulant. It is formed in the posterior lobe of the gland, and is not confined to mammals, but is present also in birds and fishes. Its action is a direct one upon the secretory epithelium.
5. An inhibitory hormone is produced by the foetus.

BIBLIOGRAPHY.

1. Routh. Trans. Obstet. Soc., London, 1897.
2. Ribbert. Archiv. f. Entivickelungsmechanik, bd. vii, 1898.
3. Fellner. Deutsche Gesellsch. f. Gynak., Halle, May, 1913.
4. Marshall and Jolly. Trans. Roc. Soc., vol. cxcviii B., 1906.
5. O'Donoghue. Quart. Journ. Micros. Science, vol. 57, pt. 2, 1911.
6. Ancel and Bouin. Comp. Rend. de la Soc. de Biol., t. lxcii, 1909.
7. Starling and Lane-Claypon. Proc. Roy. Soc., vol. lxxvii B, 1906.
8. Foa. Archiv. d. Fisiol., vol. v, 1908.
9. Biedl and Konigstein. Zeitschrift. f. exper. Path. u. Therap., bd. viii, 1910.
10. Basch. Monapschr. f. Kinderheilk., bd. viii, 1909.
11. Bouchacourt. Compt. Rend. de la Soc. de Biol., 1902.
12. Lederer and Pribram. Pfluger's Archiv. f. d. ges. physiol., bd. cxxxiv, 1910.
13. Ott. "Internal Secretions," Philadelphia, 1910.
14. Ott and Scott. Proc. Soc. Exp. Biol., New York, Dec., 1910.
15. Schafer and Mackenzie. Proc. Roy. Soc., vol. lxxxiv B., 1911.

16. Magnus and Schafer. Proc. Physiol. Soc., July, 1901.
17. Schafer and Herring. Trans. Roy. Soc., vol. cxcix B, 1906.
18. Comte. "Contribution a l'etude de l'hypophyse," 1898.
19. Herring. Quart. Journ. Exp. Physiol., vol. vi, No. 1, 1913.
20. Schafer. *Ibid.*
21. Heaney. "Surgery, Gynaecology, and Obstetrics," July, 1913.
22. Gavin. Quart. Journ. Exp. Physiol., vol. vi, No. 1, 1913.
23. Hammond. Quart. Journ. Exp. Physiol., vol. vi, No. 4, 1913.
24. Watson. Journ. Physiol., vol. xxxiv, 1906.
25. Schafer.
26. D'Errico. "La Pediatria," No. 4, 1910.
27. Cushny. "Text-book of Pharmacology," 1906.
28. Hammarbacher. Pfluger's Archiv., bd. xxxiii, 1884.
29. Eckhard. Beitrage z. Anat. u. physiol. Geissen, bd. viii, 1877.
30. Rohrig. Virchow's Archiv. f. path. Anatomie, bd. lxvii, 1876.
31. Mironow. Archiv. des Sciences Biol. de St. Petersburg, 1894.

CASE OF CHORION EPITHELIOMA.

By Ralph Worrall, M.D.,

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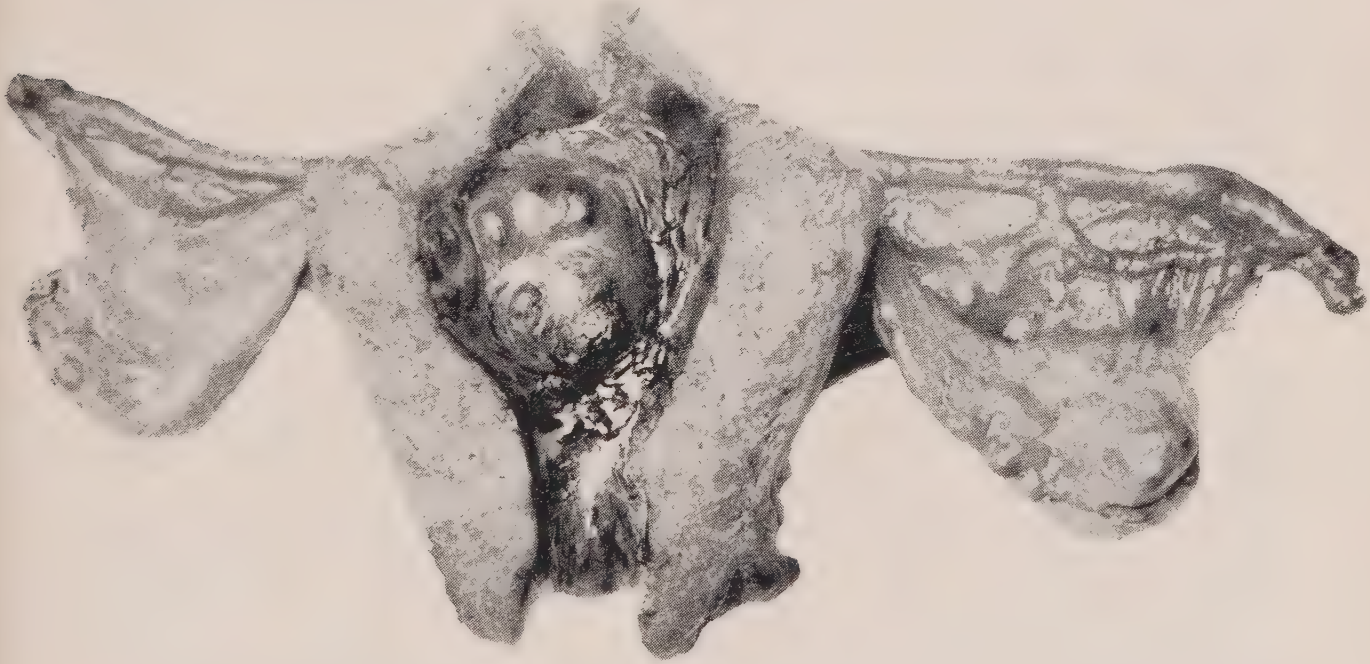
I MIGHT perhaps be allowed to recall a few facts concerning the pathology of this disease before narrating the particular case which I wish to bring before you.



Chorion epithelioma is a disease of foetal structures arising in the two epithelial layers covering the chorionic villi, named respectively Langhan's layer and the syncytium, which together constitute what is called the nophoblast, the function of which is to eat into the decidua, and thus form a nidus for the ovum, and also eat into the blood-vessels and form the necessary blood simises. In hydatidiform mole, and still more in chorion epithelioma, this penetrative action becomes excessive, so that in hydatid mole it is common for the musculature to be entered. When the hydatid mole comes away masses of cells are left, which usually degenerate and die, but in chorion epithelioma proliferate and form a highly vascular growth, which projects into the blood-vessels. Sooner or later cells of the growth become detached, and are carried into distant or neighbouring organs, and thus quickly give rise to similar metastatic growths, the favourite seats for these being the lungs and vagina.

In 50 per cent. of the recorded cases the disease has followed hydatid mole. It may, however, occur after ordinary abortion or full-time labour, or even in the male, when it is said to arise in "rests." The chief symptom is haemorrhage, not controlled by curettage or any other measure. The diagnosis rests mainly on the recurring haemorrhage and the examination of the scrapings.

The treatment should be prompt total extirpation of the uterus and appendages, and this should be done even if there are secondary growths, because cases are on record where these have spontaneously disappeared after the removal of the primary growth, the *modus operandi* being pressure atrophy of the cells by blood-extravasation.

Ellen S.: thirty-six; eight para; no abortion; missed one period, then began to bleed and vomit in April, 1913. Dr. Thom, of Yass, emptied the uterus of a vesicular mole pregnancy. The haemorrhage recurred six weeks later, for which she was again curetted. Three weeks after this it recurred again so severely that it nearly proved fatal, in spite of plugging. She had lost a stone in weight. There was an evening rise of temperature to 100°–101°, considered to be due to a tuberculous focus in her lung, from which she had suffered for nearly a year, and which had given rise to several attacks of haemoptysis. I saw her on the 18th August—that is, three months after the uterus had been emptied of the hydatidiform mole. She was blanched and emaciated, pulse 100, very weak. Temperature, 100°.

The uterus was normal in position, softened, enlarged, somewhat irregular. On the 21st August I did total hysterectomy, with removal of both appendages, by vagino-abdominal method, sewing a vaginal flap over the os to prevent escape of uterine contents. The wound was closed without drainage. The operation went well; there was no shock. Easy recovery followed, but the slight evening pyresia continued up to the time she left hospital. She returned to her home in the country, and her death was announced in the paper on the 30th December. I have since ascertained it resulted from haemoptysis coming on suddenly after a long walk, and was considered by the doctor who gave the certificate to be due to phthisis.

The specimen macroscopically presented the appearance of an enlarged, softened, vascular uterus. On section, a dark-red mulberry-looking tumour the size of a pigeon's egg was found on the anterior wall. Microscopically, Dr. Jamieson reports it was typical of chorion epithelioma.

DYSMENORRHOEA.

By J. A. G. Hamilton, M.B., B.A.,

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It is not my intention in this short paper to enter into a wide discussion on the classification, etiology, causes, symptoms, and treatment of this somewhat common and ambiguous disorder. Any of us who have been in practice for a number of years must notice that painful menstruation in young girls, especially amongst the leisured classes, and amongst shop and factory girls, and others whose hygienic surroundings are not of the best, is decidedly on the increase, while in my experience dysmenorrhoea is comparatively rare amongst farmers' daughters and amongst those who are either able or willing to lead a healthy outdoor life.

Dysmenorrhoea, except in cases of congenital uterine malformation, rarely appears in the first six or twelve months of menstrual life. When the pain appears it is an indication of some lack of balance in the development of the menstrual organs, due to want of proper attention to hygiene rules at the most critical period of a young girl's life, and is, in my opinion, very frequently a derivative effect of the highly specialized education of girls at the present day. The question is whether we are not overeducating our girls, to the extent that we are interfering with their general health, their menstrual function in particular, and their chances of being good mothers. An improper mode of life, irregular hours for rest and food, insufficient exercise, lack of fresh air and sun, resulting in a poor development, predispose the woman, as the man, to a variety of pathological conditions; but as the reproduction apparatus in woman is more delicately organized, it more especially suffers as the result of any general systemic derangement. Neglect during menstruation, especially in young girls, is a frequent cause of subsequent trouble. The effect of menstruation on the whole system is remarkable. The nervous, vascular, and digestive systems all share in the menstrual functions. The usual work of the girl at school, or at any employment, should be altered to suit the altered conditions at that period. Parents and guardians should be taught that a girl at puberty requires special care, and if she is called upon to compete with the other sex in mental and physical work it can only be done, in most cases, at the expense of her sexual development. Dysmenorrhoea is much more common than it was when I commenced practice, and one can only come to the conclusion that the present mode of life, the demands of society, and the higher education of girls is the cause. In discussing this question I will confine my remarks to dysmenorrhoea in virgins, for in them pelvic examination and local treatment is difficult to carry out, and only undertaken when absolutely necessary; whilst in married women local examinations and treatment can be undertaken, and we have always the hope that pregnancy will cure the condition, except when caused by adnexal trouble or pelvic inflammation.

All women, even in good health, have some discomfort at the menstrual period. This is easily understood when the nature of the function of menstruation is considered. The various changes, especially the congestion which occurs during the normal process of menstruation, must give rise to a certain amount of pelvic and general discomfort. The sensitiveness of the nervous system in woman varies so much that what is described as "discomfort" is in others a "pain," whilst many describe their sufferings as "agonizing"; but the difficulty arises in fairly estimating the suffering of the individual, and in determining when the disorder has ceased to be physiological and become pathological. There is no doubt, however, that a large number of girls demand our attention and treatment for menstrual suffering; the pain is not merely a temporary one of a few hours, but a prolonged one, seriously interfering with their work or social enjoyments. In some cases no sooner has the pain of one epoch passed than she begins to look forward with dread to the next, interfering to a great extent with her health and happiness. Further than that, dysmenorrhoea brings in its train many mental and nervous derangements. Many of these neuroses are no doubt due to changes in the ovaries, and must be carefully considered in dealing with dysmenorrhoea. Ovarian secretion is a subject causing a good deal of discussion at present, and there is probably much to be learnt about the relation of ovarian secretion to dysmenorrhoea. It is likely that hypersecretion of the ovary produces an excessive stimulation of the uterus. This may account for the excessive bleeding, clotting, and severe contractions in some cases of dysmenorrhoea.

The Varieties of Dysmenorrhoea.

The classifications given by different writers are endless, possibly the lack of any anatomic reason and the futility of all means of relief in many cases accounts for this. Dysmenorrhoea is sometimes met with when no palpable lesions can be found; this is generally spoken of as idiopathic or neuralgic. No doubt we occasionally meet with cases which are purely nervous, and which may be due to a faulty innervation of the uterus, be it an anatomical or functional defect.

For the sake of convenience I will discuss dysmenorrhoea under two headings—(1) Dysmenorrhoea due to congenital defects; (2) dysmenorrhoea due to acquired lesions of the uterus, tubes, ovaries, or other organs.

Dysmenorrhoea due to Congenital Defects.

In this class of case the uterine dysmenorrhoea is associated with defective development. The uterus after puberty in such cases continues in a more or less infantile condition. Byford suggests that these uteri should be called "puerile" rather than "infantile," because a true infantile uterus does not menstruate, but in a "puerile" uterus the function has been established, so that they can menstruate. The body and cervix may be "puerile"; the want of development may affect both the body and cervix; the corpus is often acutely anteflexed; the cervix is long, tapering, and narrow; the malformation affects the cervical canal more or less, which is either sharply kinked or is the seat of a pronounced stenosis. Under this class of cases we may fairly admit the dysmenorrhoea caused by a pathological anteflexion of the uterus. This position is really a defect of development, when in many cases the uterus is bent on itself nearly double, the body and cervix both pointing in the direction of the pelvic outlet. This is probably caused by a poorly developed flaccid corpus being forced down on its cervix by intra-abdominal pressure. This flexion is often accompanied by a stenosis of the os, which has given rise to the term "obstructive" or "mechanical" dysmenorrhoea, but this mechanical obstruction ere long causes a secondary congestion. The purely mechanical theory of dysmenorrhoea was originally taught by Simpson and Sims, but is now almost universally rejected. It is now believed that the pain is to a great extent due to irritation from congestion, the abnormal vascular tension. The result of interference with the circulation in the vessels at the point of flexion irritates the nerves of the uterus, and causes the pain.

Dysmenorrhoea due to Acquired Lesions.

This may be a symptom of almost any pelvic diseases, retro-displacements of the uterus, fibroid tumours, endometritis, pelvic inflammation, ovarian disease. The dysmenorrhoea of retro-displacements is due to the altered position, plus an associated endometritis, or to the pressure of the uterus on the ovaries. The dysmenorrhoea of fibroid tumour is caused by the painful contractions of the uterus produced by the irritation of the fibroid ; ovarian dysmenorrhoea frequently results from a thickening of the ovarian capsule ; whilst in tubal disease the pelvic engorgement always present at the menstrual period adds to the congestions of an already inflamed tube or tubes. As a rule, the pain is characteristic, and helps the diagnosis as to whether the dysmenorrhoea is of the obstructive type or caused by some acquired lesions. In the obstructive dysmenorrhoea the pain comes on before the flow, and is relieved when the flow fairly starts ; while in the acquired form the pain comes on either with or before the flow, and is more or less constant during the period, and is not of that labour-like pain of obstruction.

Treatment.

It is important to remember, on the question of treatment, that dysmenorrhoea is very often a local manifestation of a general condition. A great many of these cases will improve with general treatment, change of habits, and change of location.

The treatment is palliative and mechanical.

Palliative treatment consists in dealing with all general conditions, such as anaemia, &c. In treatment of the actual pain, pelvic depletion is called for. Anything that depletes the pelvis diminishes the hiperemia upon which the pain depends ; rest in bed, hot sitz-baths, the free use of saline aperients before the flow is of the utmost value ; drugs in the shape of aspirine, phenacetine, antipyrine, bromide of potash will be of service. Undoubtedly opium and alcohol give the most prompt and efficient relief, but they are to be employed with the utmost caution, as their temporary employment may become a permanent habit. Many cases of the morphia or alcohol habit in women might be traced to commencing them for the relief of painful menstruation.

Mechanical Treatment.—For dysmenorrhoea which is due to an obstruction of the cervical canal, associated with an anteflexion of the cervix or of the corpus, and the accompanying congestion, dilatation is the procedure of choice. If the obstruction is the sole cause of the menstrual pain the patient should be cured by the operation. There are several alternative means of doing this. My practice is, under an anaesthetic and with the fullest aseptic precautions, to dilate the cervix, which is fixed with a vulsellum on each lip, and fully dilate with Hegar's dilators. Many of these cases are difficult to dilate, and when I reach about No. 8 Hegar I frequently find they will not dilate further, so instead of using forcible dilatation with Goodell's dilator I pack the cervix with a strip of gauze. This has a softening effect on the rigid cervix, and in twenty-four hours it will dilate fully. After dilatation the uterus is curvetted, swabbed out with some mild chemical such as tinct. iodi., to clean out the interior. The entire uterus is then packed from the bottom out with iodoform gauze, or some equivalent with plenty of antiseptic in to keep it sweet, taking particular pains to pack widely through the cervical canal. I leave this gauze for three days if there are no contra-indications, renewing it every three days for a week or two. This gauze straightens out the cervix, and, acting as a foreign body, causes the uterus to contract, and this stimulates development. In a few selected cases I have had good results from the use of a stem pessary. I know there is a prejudice on the part of those of us who practised gynaecology in the antiseptic days, or the earlier days of aseptis, against the stem pessary; it was formerly used frequently, and led to serious pelvic inflammation in many cases, and for a time its use was practically abandoned; but in selected cases it has, in my opinion, its place, and can be used with comparatively little risk, provided it is used with strict aseptic precautions, and never in infected cases. The metal spiral spring pessary I use is hollow in the centre, and allows of free drainage, being flexible; it does not cause pressure symptoms where its end comes in contact with the endometrium. After its insertion the patient is kept in bed for eight or ten days. As a rule, there is a little pain for the first few days, but this soon subsides; in many cases there is no pain; if the pain is severe, the pessary is removed; if necessary, a larger pessary can be substituted after a week or two. I have tried leaving the stem pessary in during the next period, but found on one occasion that the menstrual fluid caked in the hollow of the pessary, and blocked it, so I have not left one in during a period since. I noted in this case that the patient complained of just as much pain during the period when the stem pessary was *in situ* as before; possibly this caking of the menstrual flow might have been the cause. I have tried leaving an Outerbridge drain in the cervix for one or two periods, but have seen the menstrual pain just as severe with the drain *in situ;* this is a strong point against the purely obstructive theory. In case of a poorly developed uterus causing dysmenorrhoea, the logical treatment consists in using remedies to produce development; the stem pessary does this. The patient should be kept under observation for some time, and, if necessary, the pessary should be reinserted after two or three months.

Within the last two or three years I have used this special stem pessary for a number of young girls suffering with dysmenorrhoea, and I have never seen any bad results follow its use; in many cases the result was eminently satisfactory, in others the pain returned after a few months as severe as before. If the obstruction is the sole cause of pain, this or some form of dilatation will cure it. This is not true if the dysmenorrhoea is of the neurotic or neuralgic type. It is probable it is in this type of case, where so many remedies are tried, and for which in many instances nothing seems to do much good. Dilatation by means of tents is transient in its results; the operation has given frequent and serious warnings in the shape of pelvic inflammation. Division of the cervix as introduced by Simpson used to be a very common treatment some years ago. A deep incision was made in the posterior wall, and sometimes in one or both lateral walls, and allowed to heal by granulation. I have seen alarming haemorrhage from this operation, and one can easily imagine the scar of these incisions becoming the seat of malignant disease in later life. Cancer generally commences in a seat of traumatism, as presenting a focus of irritation and a point of lessened resistance. For this reason I think incisions of the cervix which are allowed to heal by granulation are to be avoided. I have never seen cancer commence in the vaginal portion of the cervix, except where there had been some traumatism, either the result of labour or instrumental interference.

In cases of "infantile" or "puerile" uterus with anteflexion you not only have the anteflexion, but some retroflexion. The condition is aggravated by the uterus settling back. Some of these cases will be relieved by shortening the round ligaments and shortening the cervix. Where there is marked elongation of the cervix this can be overcome by amputation of the cervix, or by Dudley's operation. This latter operation has given me good results where the elongation is most marked in the posterior wall. The posterior lip of the cervix is divided in the middle line up to the vaginal attachment; the cut surfaces are held apart, and deepened by means of a scalpel; then a small angle is cut out by each side; the cut surface is then folded on itself by a single silkworm-gut suture; this brings the external os back to the angle of incision, and the cervix points backward in the normal position towards the hollow of the sacrum, instead of forward towards the vaginal outlet.

In the *dysmenorrhoea due to acquired lesions*, the lesion, whatever it may be, has to be treated, and the dysmenorrhoea should be treated only in conjunction with and part of the disease. In the "Ovarian dysmenorrhoea," of course, if there are any gross lesions of the ovaries they will probably have to be removed; but oöphorectomy for dysmenorrhoea in the absence of gross lesions has frequently substituted one form of neuralgia for another, and in young women has added the discomfort and train of symptoms attendant on the artificial menopause to their other troubles.

There is an acquired lesion which, in my opinion, is not an infrequent cause of dysmenorrhoea. I refer to an "inflamed appendix." In some women the appendix is long, and hangs down into the pelvis, taking part, from its proximity, in the pelvic congestion which accompanies normal menstruation. This congestion of the appendix is increased at each period, and eventually becomes permanent, and gives rise to severe pain, resembling intra-uterine dysmenorrhoea. This condition can be recognized by a well-marked tenderness over the region of appendix, which is generally increased at each period. I have in several cases completely relieved persistent dysmenorrhoea by removal of the appendix.

Unfortunately, there are a certain number of cases of dysmenorrhoea which resist all forms of treatment, and the victims become physical and mental wrecks unless the trouble is relieved by matrimony and pregnancy. The initial difficulty in discussing dysmenorrhoea lies in our want of a complete knowledge of the ordinary physiology of menstruation. In cases of dysmenorrhoea associated with sterility the explanation of both conditions is to be sought for rather in general congestion of the pelvic organs, more especially of the endometrium, than in any mechanical cause. The purely obstructive theory of sterility scarcely appears to me to have any foundation, for, as Jackson puts it, "The obstacles which are overcome by spermatozoa in their progress towards the uterine cavity are, to say the least, remarkable."

Dysmenorrhoea is probably due to congestion of the uterus associated with spasm of the os, whilst sterility is due to the hyperemic conditions of the endometrium. It is certain that the cure of an anteflexion or a retroflexion, or, in other words, the removal of causes apparently mechanical, has resulted in the cure of dysmenorrhoea, and is sometimes followed by pregnancy; but, on the other hand, these mechanical means, while relieving the dysmenorrhoea, have often failed to remove the sterility—failed because they did not remove some conditions other than the narrowing of the cervical canal. Such a condition seems to me to be a hyperemic state of the endometrium which is inimical to the grafting of the ovule. So, no matter how we discuss the varieties of menstrual pain, no matter what the exact origin of the pain may be, the essence of dysmenorrhoea seems to me to be *congestion*.

PITUITARY EXTRACT IN OBSTETRIC PRACTICE.

By James R. Purdy, M.B., C.M.

Mr. President and gentlemen,—I do not intend to take up your valuable time by giving you a dissertation on pituitary extract, its origin, preparation, &c., but simply to relate my experience in its use.

I first used infundibular extract, as it was then called, in 1908, giving it in an extreme case of eclampsia with shock and collapse. I was satisfied that the extract had a marked effect for good in the case. I used it on and off afterwards, but always for threatened haemorrhage, or shock, or exhaustion. Of these usings I have no exact record.

I first used pituitary extract in my obstetric practice on the 25th December, 1912. (It was used for the first time in obstetric practice by Dr. W. B. Bell—B.M.J., December 4, 1909). I gave 1 c.c. to a nine-para then attended by me for the first time. She had a history of long lingering labours, with bad recoveries. I found the os was well dilated, the head in mid cavity, the presentation normal, the pains slow and feeble. Twenty-three minutes after injection of the extract the child was born. Since that date I have given pituitary extract in twenty-six cases. In eight of these cases I applied forceps, and turned once. The other seventeen were delivered without any other interference; the shortest in seven minutes, the longest in thirty-six minutes, the average duration being twelve minutes.

In the 36-minute case the cord was round the shoulder. In the forceps case I gave the extract, because in the earlier cases I was not then aware how ever a very slight obstruction will retard and even prevent the action of the extract. I soon found out this from experience, but continued to give the extract, even in occ. post. cases, because I had assured myself its use was attended with great benefit, other than the quickened delivery of the child.

Here the question of diagnosis comes in. I am still firmly of the opinion that correct diagnosis is of paramount importance, perhaps now even more so than before. The practitioner ought to train himself to obtain a diagnosis of the case and a prognosis also, with as few examinations as possible, preferably only one.

It has been found by many—I know it was my experience—that pituitary extract, although acting vigorously, does not help on labour if the os is undilated. I have already said that a slight obstruction will retard or even prevent the action of pituitary extract, and I wish to emphasize this point. If one gives the extract in a case of undilated os, occ. post., or any of the other known causes of obstruction and delay, then one is looking for trouble. I must say I have seen no bad effects so far in its use, but it does not need a very vivid imagination to picture disasters that might readily occur in a pituitary extract acting on obstructed uterus.

In my work I do not give the extract until I am prepared to deliver the woman, if from any cause, known or unknown, the drug fails to have the desired effect.

My eight forceps cases are of interest. Six of the cases occurred before the middle of July, 1913, during which period I gave the extract in all to nine cases. Since the 15th July I have applied forceps twice and turned once in seventeen cases in which the extract was given. The first period was my learning or groping period. Of the two latter forceps cases, one was a high-up operation, the os fully dilated, head engaged in the brim. The turning was a high-up case. In the two high-up cases I gave the extract partly to see if it might bring down the head, and partly because of its good effect in ways other than that of hastened delivery.

Many of my later cases were delivered without chloroform, or a very slight dose of it.

I am persuaded deep anaesthesia retards in a great measure the action of pituitary extract. I found the patients, although suffering pains of an augmented nature, bore the pain better. Very often I found putting the mask on the patient's face minus chloroform quietened them. I saw no harm to either mother or child in any of my cases.

The placenta is usually quickly delivered. It is generally expelled from the uterus with the child. I thought in some of my early cases there was a tendency to bleed, but I soon did away with this anxiety by giving a hypodermic injection of ergone or ernestin and morphia. I always inject the pituitary extract deep into the gluteus maximus, and I always give 15 minims.

I am satisfied that in pituitary extract we have a most valuable drug, and one I would not like to be deprived of.

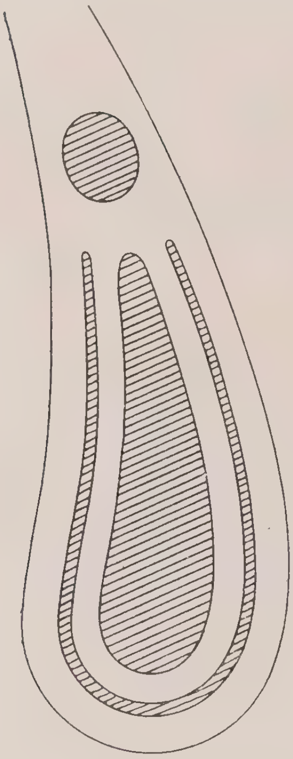
A NEW PATTERN OF MIDWIFERY FORCEPS.

By W. R. Stowe, M.R.C.S. (Eng.).

Obstetrical technic proceeds along in its old quiet way; no great or revolutionary improvements mark its progress as in the case of the sister arts, medicine and surgery; and yet the care of the mother in the exercise of the supreme function and of the offspring in its birth present great opportunities in the general scheme of conservation of life, and it behoves us to take stock of our methods and armamentarium and meet the difficulties that still assuredly exist. The old dictum *Cito tuto et jueunde* holds good as ever, but the *tuto* should be written in letters of gold.

Safety, immunity of mother and child from injury, however trivial, is the keynote of successful midwifery; we should leave them at the end of the puerperium as free from any blemish, internal or external, as is humanly possible. *Cito* also demands emphasis; the passage of the foetus must be expedited, with due observance of the speed-limit, to conserve the mother's energy.

Safety has been and is often imperilled by non-observance of the speed-limit; the circumstances of obstetrical work invite slackness in this respect; instrumental delivery then becomes a menace to pelvic integrity and maternal well-being. Forceps require as nice handling as a teaspoon in an egg, however perfect their design; any improvement that tends towards safer manipulation will be welcome. Used in Egypt B.C., designed by Chamberlen in the seventeenth century, improved by Smellie Simpson and others—forceps are classical sacred, forged by the gods of old, and for very many years now the last word in the matter of design has been taken as said. But we must all have felt at times that they were capable of improvement, and that is the suggestion I have the temerity to make.

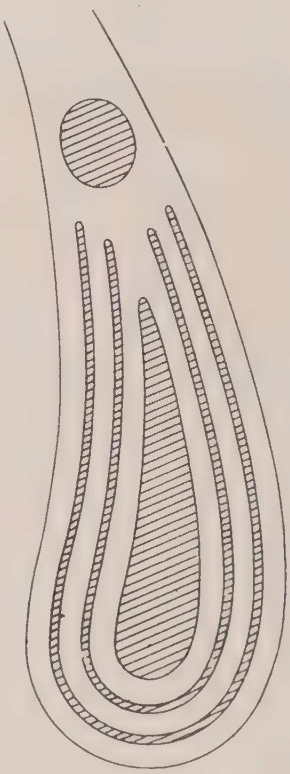


The present pattern embodies two main ideas, a grip—somewhat merciless, by the way—and a tractor. Traction is the idea that is uppermost in the minds of the majority when entering practice, but experience soon indicates that steering, feeling for the paths of least resistance, is of far more importance. "Pulling" is hardly as accurate as "pushing," which more nearly describes my own method of applying the energy, as I work away from my body. The grip, however, is *the* factor that demands modification. The extreme 1–2 in. of the blade does practically all the damage, because the pressure is not sufficiently widely or evenly distributed, and the tip is sharp and incurved.

With the aid of some diagrams I will endeavour to demonstrate the direction of possible improvement as it occurs to me.

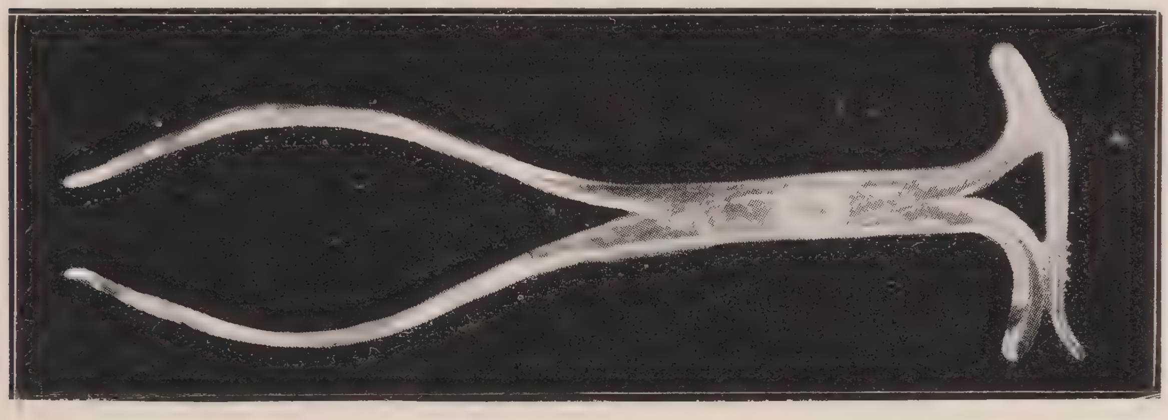
The first slide shows one way of distributing the pressure; it has manifest disadvantages, owing to want of resilience or adaptability of the rigid middle bar. This slide and the next show the double and triple loop pattern. The sketches are crude, and do not pretend to give the right proportions. The two or three loops will be thinner and narrower individually than the present blade, and will have more spring in them, the inner loop most. By careful graduation of the springing and proportions of the loops it should be possible to produce a blade that will give even and intimate contact without undue pressure over any point.

The tip of the blade will be offset a bit, and have an easier contour.

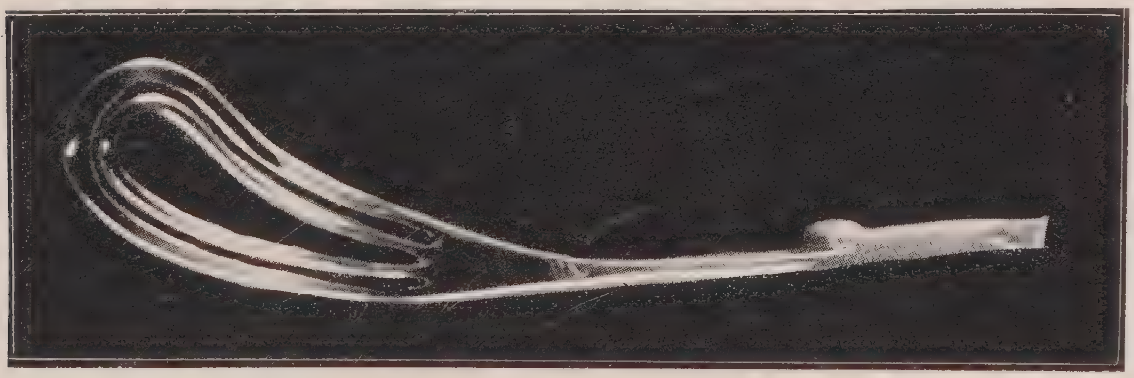


In instrumental delivery we apply forceps high or low. For the low operation the general design of the modern instrument is satisfactory. The low operation must have been in the mind of the inventor, as it is ill adapted for high work. I believe the chief difficulty in the high operation is due to the fact that the modern forceps are not suitable for it.

Consider the presentation when the head is well engaged in the brim. It lies almost transverse, the sagittal suture presenting, the fontanelles almost equally accessible. Can you expect the modern instrument to take a safe effective grip under these circumstances? The tip of one blade will be over or near an eye, that of the other between the ear and the occiput. The eye is in danger; the scalp is exposed to injury; and the pressure generally antagonizes moulding, and makes it necessary to use more force than is fair to the maternal tissues or the foetus. In addition to that, you are at a great disadvantage when endeavouring to rock the head on its longitudinal axis off the pelvic shelf into the hollow of the sacrum.



I suggest that forceps without any pelvic curve in the ordinary sense be made, and that they be applicable anteroposteriorly, or nearly so. The slide illustrates the principle. It will be contended that the tissues over the promontory and the urethra are imperilled; if they should happen to be injured I should be inclined to blame the operator rather than the instrument. The extra thin blade lying snugly up against the foetal head will trespass so little on the available diameter that the danger will be negligible, assuming that the tractive effort is applied correctly in the path of least resistance. The pressure with this pattern will assist moulding materially.



I feel that the lines of improvement indicated in this paper are worth working on, and in due time hope to furnish results of practical experience. No doubt, on the "trial and error" principle, defects will be discovered, and further modifications will be necessary. No insuperable difficulties are apparent at present, and if in the end we can advance the technic of instrumental delivery even a little, the time and trouble will have been worthily expended.

Since writing the above Down Bros. have supplied instruments made to my specifications, and I have had many opportunities of testing them; the results have come up to anticipation, though there is still room for improvement. The above photographs give some idea of their general appearance.

Advantages.—(1.) They are half a pound lighter than the ordinary pattern; this improves the "touch" materially. (2.) There are no projections; the "lines" are clean, easy flowing curves everywhere. (3.) The length from the lock to the ends of the handles is 2 in. shorter than usual; the full-length handle gets in the way at times. (4.) The catch and ratchet allow of proper adaptation to the diameter of the foetal head; this works well in practice; the ordinary pattern locks to one diameter, or if the head is big produces undue compression. (5.) The modified French lock is quite satisfactory. (6.) The double loop increases the area of application, especially in the last 2 in., where it is most wanted, and minimizes the effect of pressure on the foetal tissues; the inner loop has "spring" in proportion to its area of contact, allowing it to adopt itself to the head-contour, it also prevents the cranial prominences from bulging through the loop, and at the same time does not compress unduly, rather tending to improve the moulding of the foetal head. (7.) The outcurved tip cannot cut in, as the present one may do in a difficult case; it should entirely prevent damage over the sterno-mastoid or outer canthus.

On the whole, I find these instruments handier and certainly more merciful, and on these grounds suggest that they are worthy of a trial.

They are designed to discourage forceful manipulation, and yet are substantial and strong enough to meet all requirements.

LEUCORRHOEA: ITS BACTERIOLOGY, PHYSIOLOGY, AND SUGGESTED TREATMENT.

By A. N. Norman McArthur, M.B., B.S., M.R.C.S., L.R.C.P.,

Senior Gynaecologist to St. Vincent's Hospital, Melbourne.

In writing a paper on leucorrhoea, I realize that the subject may be considered of such minor importance as hardly worthy of consideration, so many physicians entirely disregard the complaints of the women regarding the discomforts of leucorrhoea. It is looked upon so often as being of so little importance. With a woman, it is a source of great discomfort, frequently produces marked irritation, soreness of parts and swelling of vulva, mental distress and anxiety, and at times eroticism. The methods adopted for curing the condition are most unsatisfactory; curetting in one case out of twenty may be satisfactory, but in nearly all cases that have been curetted there is a return of the discharge, and it cannot be otherwise, as I will demonstrate, when bacilli are lodged in the glands of the cervix. Local applications of the various antiseptics produce no good results even after prolonged office treatment. Electric ionization, I am informed, gives some benefit. For the past two years, in order to better understand the condition, I have taken a culture of the discharge from every woman suffering from leucorrhoea who has come to my office for advice, and I have also taken smears on a glass slide. From these cultures I have made vaccines. Two years ago, also, Dr. Williams, who was then my House Surgeon at St. Vincent's Hospital, Melbourne, started on a series of very close investigations on the "Flora of the Vagina." He has now completed his observations, and he has permitted me to use in this paper the results of many of his investigations. I have only worked on those cases that have come to consult me. I have made no investigations on Döderlein's bacillus. I have not cultivated it, nor had the opportunity of investigating its bacteriocidal properties. Dr. Williams has done all this, and has selected his cases for investigation on the female from childhood upwards. When one really reviews the situation thoughtfully, it is indeed wonderful that even the virgin vagina should be found free of pathogenic organisms. Take, for instance, the structure of the vagina communicating within through uterus and tubes to the peritoneal cavity, and without through hymen and labia to the skin. At its external orifice mucous lined labia minora in apposition, and Bartholin's glands keeping the surface moist. The vagina with stratified epithelium, and its surface lying in folds and rugosities; the cervix covered with cylindrical epithelium, secreting from cervical glands a mucus that keeps the vagina moist, and all maintained at an even body temperature; add to this at the end of each period degenerated blood and exfoliated epithelium, and a perfect culture-tube is produced. Then, remember the vagina's environment: the folds of moist warm labia covered externally by hair; its close proximity to the anus, which permits of the passage outwards of millions of bacteria daily; and from the front, drops of drying urine remaining about the meatus; the close apposition of the limbs increasing the local warmth and the skin-moisture. Then, again, every month menstruation leaves dried blood and serum about these parts. The skin of the external genitals simply swarm with all kinds of pathogenic organisms. There is surely something to prevent the growth of pathogenic organisms that so easily can gain access to the vagina, and here Dr. Williams has been able to verify the work of all others who have investigated the matter—that the acid producing Döderlein's bacilli are bacteriocidal in their action. His investigations with the adult virgin vagina shows that there is little secretion, which is colourless and is decidedly acid in reaction. The microscope shows a large number of stratified epithelial cells and broken-down epithelial debris and fatty particles.

A great number of bacilli covering everything, and occasionally a few cocci are present, and a marked absence of leucocytes, and the great number of bacilli in the field attract attention. If a slide be washed with absolute alcohol and cleared before staining, the stratified epithelium and bacilli stand out very plainly, the fat and mucus being dissolved. On staining by Gram's method these bacilli are gram negative, or rather on the borderland between gram negative and gram positive, and further investigation proves them to be one of the lactic acid type of bacilli that were discovered by Professor Döderlein, after whom the bacilli are called. Occasionally are found with Döderlein's gram positive cocci which are never numerous. These cocci are *Staphylococcus albus*. Very occasionally diphtheroid bacilli are found, but when found are few in number.

In making cultures from the virgin vagina they vary slightly, but the results are practically the same. Döderlein's bacillus is always present, sometimes *Staphylococcus albus*, and sometimes diphtheroid bacillus are found. These three are non-pathogenic—that is, the inoculation of any or all of these germs into the guinea-pig will produce no result.

Dr. Williams adopted Döderlein's method of drawing up the vaginal secretion under rigid aseptic methods into a tube, and using as a culture-medium—(1) Acid glucose bouillon grown anaerobically; (2) acid glucose bouillon grown aerobically; (3) alkaline hydrocele agar.

The best results are obtained by using acid glucose bouillon. Having once got the Döderlein's bacillus culture, experiments can proceed as to the bacteriocidal effect on pathogenic organisms by this acid-producing organism. This has been proved undoubtedly by very many observers. It has been frequently demonstrated that with the exception of *Gonococci* the known pathogenic organisms in the presence of Döderlein's bacilli cannot multiply. A time will come when either one or the other organism will prevail. In my experience with the leucorrhoea of women, in the greater number of cases there has been the possibility of intromission of the penis pushing into the vagina bacilli from the margin of the vulva, or conveying them on the gland or skin of the organ, or from the urethra. This is an oft-recurring means of introduction, and shortly after coitus a smear has been taken from the vagina, and a large number of organisms are found, and dominate the number of Döderlein's, but twenty-four hours afterwards these organisms are absent, and Döderlein's predominate. The usual smear of leucorrhoea reveals on examination—Mucous masses (great amount), leucocytes (very few), epithelial debris, Döderlein's bacilli, cocci; and when a culture is made the growth is made up of Döderlein's *Staphylococci, Streptococci,* and a diphtheroid bacillus.

All these cases in which I have made my observations were such that as nearly as possible were under normal conditions. Single girls with hymen intact; nulliparous married women; and multipara whose perinei and cervixes were not torn, and did not necessitate surgical interference. I used hydrocele agar, and under the most rigid asepsis I would take a platinum loop of discharge from the cervix. This hydrocele agar would be incubated, and an autogenous mixed vaccine of the bacilli would be made. Five minims of this vaccine would give a dose of fifty to a hundred million, according to arrangement. At first I injected the autogenous vaccine into the cervix, but in every case much pain was excited, which would persist for two hours afterwards. Now I always give the dose every fifth day in alternate flanks under the skin, and to sterilize the skin I use 3 per cent. spirit solution of iodine well rubbed into the skin. There is a little tenderness for the first eighteen or twenty-four hours over the spot of injection of vaccine, but it is nothing of importance. Usually a prolonged use of the vaccine is necessary.

In the use of the mixed autogenous vaccine I have come to certain definite conclusions—that when the leucorrhoea, no matter how excessive in quantity and of white-of-egg colour, it is habitual to find that it consists of mucus and fragments of exfoliated epithelium (generally stratified), and no leucocytes, and habitually when a culture is made the germs are non-pathogenic in character. To quote one for example: *Staphylococcus albus* gram + *ve*[1]; large diphtheroid gram + *ve*[1]; bacilli gram + *ve*[1]; *Nucrococci* gram − *ve*[1].

When the leucorrhoea assumes a yellow colour habitually the *Staphylococcus albus* will be found to be present; when the discharge is yellow and thick, and produces marked engorgement of vaginal and labial mucous membrane, it is usual to find the presence of the *Gonococcus* or the *Colon bacillus*. The *Streptococcus* can be found fairly often, but s usually of a very low virulence, and only once have I found it markedly virulent. I have been much struck with the frequency of the *Colon bacillus* being the dominant bacillus in a vaginal discharge. Frequently, where from symptoms and clinical aspect I expected to find the *Gonococcus* and its early associate the *Staphylococcus albus*, I have found almost a pure culture of the *Colon bacillus*. Moreover, I am quite satisfied with the evidence that has been brought before me that articular infection by the *Colon bacillus* (just as the *Gonococcus* in gonorrhoeal rheumatism) can have its origin from the colon-infected discharge of the vagina. In the great number of vaginal discharges I have investigated I have never yet found the *Pneumococcus* and the tubercle bacillus.

Now, as regards the results of treatment by mixed autogenous vaccines, I have had varying results. All my best results were when the infection was acute, when the organism was of a virulent type. In acute gonorrhoea some of the results by autogenous vaccination were dramatic. The symptoms would rapidly abate, and in six or eight weeks it would be impossible from anywhere in the cervix, vagina, or Bartolius glands to make a culture of *Gonococci*. Not always would such a rapid cure supervene. Some cases would be much more prolonged, but in all such cases the treatment was extremely encouraging. I can also say exactly the same for those acute discharges produced by the presence of the *Colon bacillus*. In most cases autogenous vaccination gave most satisfactory results.

My longest and slowest cases were those infected with the type of *Streptococcus* of extremely low virulence. Months of treatment has not seemed to limit their numbers in the discharge. As regards autogenous vaccines administered in those cases in which the culture only produced non-pathogenic germs, results were not so encouraging. The treatment in all such cases would have to be maintained from three to ten months. All cases were ultimately cured, and the dominating germ would disappear from the discharge. I was constantly being embarrassed by finding I had cured a discharge, and in a few weeks again the married woman would return with the discharge as bad as ever, and in making a culture an entirely new set of organisms had been introduced. I may say that if there be any evidence of tear in the cervix, everted or eroded os, a widely open vaginal inlet, or any other disorder requiring surgical repair, this should be attended to at the time of operation. A culture should be taken, and a vaccine treatment should commence. In this way the excessive discharge is held in abeyance as a result of mechanical removal by curetting, douching, and swabbing with iodine; the vaccine may in consequence have a better action. I may say that my observations on this subject are far from being complete; but, so far as they go, I am encouraged by results to push on my investigations further, and certainly to continue and experiment with the treatment.

Besides being greatly indebted to Dr. Williams for his investigations, I am extremely grateful to Dr. Brennan, Pathologist at St. Vincent's Hospital, for preparing many of the vaccines that I have used.

Herewith I append a few samples of the mixed autogenous vaccines I have used.

Vaccines.

Miss H.: *Staph. alb. Streptobacilli*, diphtheroid bac.; small gram − *ve* B. 5 minims = 75 mil.

Mrs. P.: *Staph. albus* gram + *ve* diphtheroid gram + *ve* large *Diplococcus* gram − *ve* bacillus gram − *ve Micrococcus.* 5 minims = 50 mil.

Mrs. B.: *Staph. albus* and diphtheroid bacillus. 5 minims = 100 mil.

Mrs. T.: Gram + *ve Diplococcus.* 5 minims = 50 mil.

Miss F.: *Gonococci* and gram + *ve Diplococci;* very few *Staph. alb.* 5 minims = 100 mil.

Mrs. H.: *Staph. alb.*, few diphtheroid bac. 5 minims = 150 mil.

——: Few diphtheroid bacilli. 5 minims = 50 mil.

Miss S.: Bac. Döderlein gram *v* + *e Diplococcus* (1 *Staph. alb.*). 5 minims = 100 mil. (three-fourths coccus, one-fourth bacillus).

AN INTRODUCTION TO A DISCUSSION ON THE TREATMENT OF RETRO-DISPLACEMENT OF THE UTERUS.

By Ralph Worrall, M.B., Mch.,
Gynaecologist to the Sydney Hospital.

Mr. President and gentlemen,—The President was so insistent that I could not refuse his kind request to open this discussion, although I knew it would be difficult for me to find the time to search through notes, and thus be in a position to give the section the results of experience as distinguished from mere impressions.

Before approaching the question of treatment it would be well to ask if retro-displacements always cause symptoms which necessitate treatment. The answer, in my experience, should be that, as a rule, sooner or later symptoms occur. These are menstrual disturbances, abnormal discharge, pains and aches, sterility. I am aware this opinion does not agree with that of Herman and most other English writers, but "I give you the tale as it has been told to me."

Next, what are the causes which produce retro-displacement? One must have a clear conception of these in order to apply treatment intelligently. The most common are those arising from conception which has ended in an abnormal manner, and thus led to the injury and subinvolution of those structures which maintain the pelvic organs in position. The next most frequent is improper mode of living, especially during the development period of life. At this time exercise associated with full rectum and bladder strongly tends to produce displacement, as does also excessive mental efforts, which impair health and divert vital energies required for the vigorous development of the genital system to another and less important purpose.

Coming now to the all-important question of *treatment*, it is evident from the frequency and warmth of the discussion on the subject throughout the world that this is far from settled. Purely hygienic, manipulative (massage), mechanical (pessary), operative (in which the procedures recommended are many and various), all have strenuous advocates. Hygiene is always wise, and, when there are no symptoms, should be the treatment of choice. Pelvic massage has fortunately few followers. Pessary treatment is still largely used, and does incalculable harm. Every one who has studied the bacteriology of the vagina, and realized how readily the normal flora become pathogenic, must admit this. Pessaries necessarily produce stasis of the vaginal and uterine secretions, and stasis inevitably leads to infection. This is seen in all the excretory canals throughout the body—wear-ducts, biliary ducts, urethral canal, intestinal canal, genital canal. It is far better to do nothing than adopt a treatment which interferes with nature ; wherefore I think the pessary treatment should be discarded.

Operative Treatment.—I have looked through my records for the past five years, and find that during that time I have done the Webster-Baldy operation, of passing the round ligaments through the broad ligaments and suturing them behind the uterus, ten times, with no mortality and one failure. It seems to me this procedure obstructs the broad ligament veins, but I am not prepared to condemn this operation without further experience of it.

The original Alexander's operation : Seventy-two times, with no mortality and seven failures or relapses. I find I am gradually doing this operation less frequently, although I still consider it is the best operation for uncomplicated retro-displacement in young or middle-aged women. In the old or emaciated, or those in whom there has been procidentia for a long time, the round ligaments become so attenuated as to be of little value ; also, I so often recognize probable appendicitis or indication of salpingitis, shortening of the broad ligaments, or abnormal size of the uterus, that the tendency is to decide in favour of an intraperitoneal operation.

Five times I have done abdominal section, plus Alexander's operation, by making a T incision of the medium incision, thus reaching the external abdominal rings. These cases did well. One could note the exact effects of shortening the round ligaments in the position of the uterus. The extra time is against this procedure, and also the feeling that when the peritoneal cavity is open it is better to adopt the method that gives the most certain results.

I have never known Alexander's operation to cause the slightest trouble during pregnancy or labour, except in one case operated on by another surgeon, in which there was great pain in the inguinal canals during the pregnancy, necessitating the induction of labour in the seventh month. I think the ilio-inguinal or genito-crural nerves must have been included in the non-absorbable sutures. Why Alexander's operation occasionally fails, even when done in apparently suitable cases, I am unable to determine.

There have been 334 ventro-suspensions in the five years; of these, 191 were primary and 143 secondary—that is, 143 were done in the course of an operation for some other condition, and the other primarily for retroversion associated with one or the other of the conditions which I have mentioned above as excluding Alexander's operation.

The mortality was nil in the primary and one in the secondary. There were five relapses at an early date apart from pregnancy, and three after labour. On the other hand, in six cases the uterus was found to be normal in position a variable period after labour. Pregnancy and labour at term occurred eleven times without unusual trouble of any kind. Abdominal section was required subsequently to ventro-suspension in thirteen cases, as follows : For ectopic gestation, band 1½ in. long ; myoma, band 4 in. long ; acute gonorrhoeal salpingitis, band 2½ in. long ; acute salpingitis, band 1 in. long ; ectopic gestation, after normal pregnancy had occurred, uterus normal in position, no trace of band ; retroversion, after two operations for the same at other hospitals, band like a piece of twine 6 in. long from posterior surface at level of inner os; ectopic gestation, band 2 in. long; adeno-myoma diffusum, band 1½ in. long; appendicitis, band 2 in. long; retroversion, for recurrence, no band; appendicitis, band 1½ in. long; oöphoro-salpingitis, band 2 in. long; appendicitis and adhesion of sigmoid to stump of left tube removed at previous operation, band 2 in. long.

In no case did these bands exceed ½ in. in width, most were less than this.

I have heard of two other cases in which my colleagues operated for relapses subsequently to labour, the original operations having been performed by me, in which there were long useless bands.

I wish to emphasize that all the above figures refer only to cases which have come under my notice, and that it was quite impossible for me to have discovered the subsequent history of the cases as a whole.

I have never seen or heard of any ventro-suspension done by myself subsequently giving rise to either dystocia or intestinal obstruction. One patient was sent into the Sydney Hospital with the diagnosis of obstruction due to ventro-suspension. Operation showed that the obstruction was due to a Meckel's diverticulum, and in no way connected with the ventro-suspension band.

The procedures grouped under the term "ventro-suspension" are so many and varied that it conveys no exact meaning without full details of the technique. On the one hand you have a surgeon, as in one of the above-mentioned cases, seeking to unite the posterior surface of the uterus at the level of the inner os to the parieties; while others avoid the posterior surface, and obliterate completely the utero-vesical space by uniting the whole of the anterior surface of the uterus to the serosa of the bladder and parieties. Each dubs his method "ventro-suspension," although in the latter of these methods the uterus is really fixed by its entire anterior surface.

In the discussion on the treatment of malpositions of the uterus at the last meeting of the B.M.A. at Brighton, Dr. Mary Scharlieb opened the discussion, and described her technique as "passing three silkworm-gut sutures through fascia and peritoneum on one side, then through the musculation of the uterus as low down as possible on its anterior surface, then through fascia and peritoneum on the other side" (it would be interesting to follow the subsequent history of these buried non-absorbable sutures in close contact with the bladder). She says, "I have never placed the suture in the fundus itself, still less have I invaded its posterior aspect." Drs. Giles, Martin, and Cuthbert Lockyer agreed with the technique, and all expressed belief in pessaries. Mrs. Scharlieb, in her reply, said, "It could not be too strenuously insisted upon—that no fixation sutures should be passed in the fundus or posterior wall of the uterus."

I say the exact opposite: it cannot be too strongly insisted upon that no suture, and especially no non-absorbable suture, should be passed through the anterior wall of the uterus. My reasons are that the uterus has no normal fixed *position*, but a normal *range of movement*. Sutures of silkworm-gut passed as described by Mrs. Scharlieb must necessarily fix the uterus. Secondly, sutures passed through the anterior wall must necessarily throw the uterus backwards to some extent, and thus invite intra-abdominal pressure to exert its force on the anterior instead of the posterior surface, as intended by nature.

The purpose of the various ligaments—round, broad, and utero-sacral—is, conjointly with the pelvic floor, to utilize the greatest, and what one would imagine to be the most disturbing, force—intra-abdominal pressure—as the chief means of maintaining equilibrium. These ligaments—" guy-ropes " as they have been called—ensure that the posterior surface of the uterus shall be exposed to intra-abdominal pressure, so that the greater the effort the more certainly is the uterus pressed forward against the pubes, while at the same time the pelvic floor, acting synchronously with abdominal strain, by pulling the posterior segment of the floor forwards against the anterior, deflects the force in a harmless direction.

If these views are correct, we should avoid any method by which the anterior uterine surface is exposed to intra-abdominal pressure, and Mrs. Scharlieb and her supporters must be held to be wrong. The object to be attained is to restore the integrity of the damaged guy-ropes by Alexander's or similar operation, or, if it seems best, to create a new guy-rope by the ventro-suspension technique, which I shall describe, while at the same time, if necessary, the pelvic floor is reconstituted so that it can carry out its important function. The technique adopted in all the cases to which I have referred is as follows: The fundus uteri is seized with volsellum forceps in the centre, about 1 line behind the level of insertion of the tubes; a round curved needle with No. 3 ordinary catgut is passed through the fascia and peritoneum of one side the musculature of the uterus at the point gripped by the volsellum, and peritoneum and fascia of the opposite side. A similar suture is passed about ¼ in. to ½ in. posterior to this. The serosa of the quarter square inch, just behind the summit of the uterus, included in these two sutures is then carefully abraded, and, by tying the two sutures, brought in contact with a similar abraded raw area on the parietal peritoneum.

This operation is easy, safe, and gives a symptomatic anatomical and physiological cure in 90 per cent. of cases. That it does this, and also that it in no way interferes with pregnancy or labour, I think my cases fairly prove. True, the guy-rope is either destroyed or rendered useless by pregnancy; but if all has been normal in the puerperium nature's apparatus will probably have been restored, and there will be no need for further help, as has been clearly shown in several of my cases. However, in order to meet this drawback to a ventro-suspension operation, I have for the past year accepted the suggestion of Murphy, of Chicago, and drawn the round ligaments over, and sutured them behind the tubes at the posterior surface of the uterine cornu before tying the ventro-suspension sutures, thus giving a reinforcement to the latter capable of evoluting and involuting.

In the A.M.G. for the 24th January there is an able *résumé* of " The Effects on Labour of Ventro-fixation," by Dr. S. Harry Harris, of Sydney, who adds two cases of his own in which dystocia occurred after ventro-fixation and Gilliam's operation respectively. Dr. Harris refers to a number of reported cases in which serious consequences at labour followed the operation, but, as I said before, I restrict my remarks to my own experience, of which I give you an unvarnished tale. It is evident that in many of the cases collected by Dr. Harris suppuration occurred, and of the others we do not know the exact technique adopted.

I have thought it best to include the cases in a supplement.

LOOPING THE CARDINAL LIGAMENTS IN UTERINE PROLAPSE.

By Arthur J. Nyulasy, M.R.C.S. (Eng.),

Gynaecologist to the Perth Public Hospital, Western Australia.

The multiplicity of operative procedures for prolapsus uteri indicates to some extent the uncertainty of opinion as to the essential cause of the condition. Could this be placed upon a completely satisfactory basis, the surgical treatment of uterine prolapse should at once become direct and definite. Assuming, as we obviously must, that the supports of the uterus have in some way been injured to permit of its downward displacement, the surgical treatment should take the form of a complete or approximate restoration of the injured parts to their normal state. If so much be granted, we must, in any attempt to evolve a rational surgical treatment, proceed to discover, if possible, what actually are the supports of the uterus.

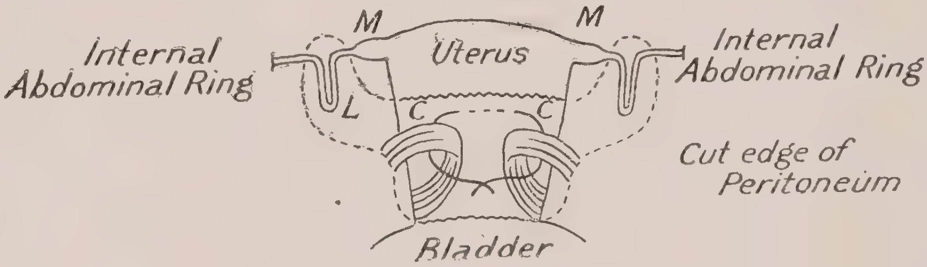
A study of the literature of the subject reveals that the pelvic diaphragm is commonly regarded as the principal support of the uterus, and that the ligaments are considered of secondary value as supports of the organ, one writer going to the length of referring to the theory that the ligaments are the primary supports as being "antiquated." As opposed to this latter attitude Emmet long ago drew attention to the fact that the pelvic diaphragm might be lacerated up to the bowel without indication of downward displacement of the uterus, even in the presence of strenuous physical work. And I recall a case in the Perth Hospital in which, in spite of some incontinence of faeces due to an old perineal laceration extending into the sphincter ani, there was not the slightest indication of uterine prolapse, although the patient was accustomed to do a big washing once a week. In this case, too, even when the vagina was widely opened up by a broad posterior speculum, the uterus could be drawn down with a vulsellum no farther than in the normal female, and at once retracted on relaxing the vulsellum. These facts suggest that, although the pelvic diaphragm may be an important element in supporting the uterus in the pelvic, it may not have that primary influence many would have us believe. It is to be noted in this connection that some surgeons, who in their theories treat the uterine ligaments with scant courtesy as supports, yet do not hesitate to make use of those ligaments as an important part of their operative procedures for uterine prolapse. Thus, it is not uncommon for them to recommend the curtailment of the round and utero-sacral ligaments. It would doubtless be urged that the object of shortening these anterior and posterior ligaments was largely, if not entirely, to cause the uterus to rest upon the bladder in its normal position of anteversion, and thus place it at an advantage as far as the influence of intra-abdominal pressure is concerned. And although to some extent this explanation would be valid, it would, I think, be a closer approximation to the truth to say that these tightened-up ligaments *support* the uterus in its newly restored anteverted position, and thus encourage the lateral ligaments of the uterus (cardinal ligaments) to gradually contract and strengthen by physiological rest.

In what might for convenience be termed the English school of treatment of prolapsus uteri the round ligaments are curtailed, or some form of hysteropexy carried out, with perhaps a curtailment of the utero-sacral ligaments, followed or preceded by some form of colpo-perinaeorrhaphy. The American school long ago attacked by the vaginal route the tissues in the broad ligaments—elytrorrhaphy—a procedure which has been elaborated by Reynolds, Hertzler, and others with some degree of success. And some of our Continental brethren have turned the uterus nearly upside down, or otherwise put it into unnatural positions, or have carried out elaborate procedures on the vagina. By all these various measures more or less satisfactory results have been claimed. But in contemplating this bare outline of the multitudinous operations which have been advocated, one cannot but realize that they cannot *all* be founded on the only rational basis of treatment — seeking out the essential cause and directly attacking it.

The only operative procedure for uterine prolapse which seems to bear the light of rigid investigation is that which directly deals with certain tissues (in the broad ligaments) passing out from the sides of the uterus. These structures—the cardinal ligaments—I have no doubt whatever, are the main element holding the uterus at a more or less definite level in the pelvis. Their supporting-power is illustrated in vaginal hysterectomy (in a normally fixed uterus), when all supporting elements, except the broad ligaments, have been completely severed. At this stage in the hysterectomy the uterus can only be drawn down by a vulsellum in the cervix exercising some force, the resistance to this force being the pull of the cardinal ligaments on the uterus. When the vulsellum is released the cardinal ligaments, pulling on the uterus, draw it back to its original position.

The cardinal ligaments can be readily demonstrated in the abdomen of the dead subject by turning the bladder down from the uterus. They commonly arise by three more or less definite heads from each side of the uterus, the middle head corresponding to the position of the uterine artery, the inferior head being attached to the upper surface of the lateral vaginal fornix, and the superior head being attached a little above the median head. G. Reynolds and E. C. Dudley lay stress on the important part the vaginal attachment of the tissues in the broad ligament plays in holding up the vagina, bladder, and rectum. Thus, according to Dudley, " the fact that vaginal hysterectomy commonly results in holding up the pelvic floor, and with it the rectum, vagina, and bladder, is because the broad ligaments are fixed in the vaginal wound." The three heads of the cardinal ligament unite together to form a band about ½ in. or more in width, which passes outwards for over 1 in. between the layers of the broad ligament. The cardinal ligament, which up to this is largely muscular, now tends to change its character, sending off fibrous bands, fanwise, to the wall of the pelvis and other parts, some of these bands, it is to be noted, being inserted into the postero-lateral wall of the bladder, and others passing up over the iliacs. After locating the ureter, the cardinal ligament may be dissected from the posterior peritoneal layer of the broad ligament, and thus completely isolated. Hooking the ligament up on the finger it is found to be elastic, and of considerable strength, and obviously quite capable of adequately supporting the uterus in the pelvis. For his valuable help in the final dissections, before completing this paper, I have to thank Dr. C. Kellaway, Registrar to the Melbourne Hospital.

During a recent visit to Melbourne I was enabled to make further dissections, verifying those already made in Perth, although much still remains to be done in connection with the cardinal ligaments. However, in spite of the comparative limitations in this regard in Perth, I felt justified, in papers to the Australasian Medical Congresses of 1908 and 1911, in laying down certain premises which appear satisfactory as working propositions. In the second paper I sketched out my present operation of looping the cardinal ligaments. The propositions referred to are: (1) That the uterus is sustained in its normal position in the pelvis by its ligaments, although capable of a certain range of movement on account of the elasticity of these ligaments; and (2) that the pelvic diaphragm prevents undue stretching—*i.e.*, strain—of the ligaments as the result of intra-abdominal pressure. In accordance with these propositions the primary supports of the uterus are its ligaments, while the secondary support is the pelvic diaphragm. If we accept these propositions as true, and believe that the cardinal ligaments are the main element holding the uterus at a more or less definite level in the pelvis, the causation and treatment of prolapsus uteri become comparatively simple. The treatment will be primarily directed to the ligaments, and, above all, to the cardinal ligaments, and, secondarily, to the pelvic diaphragm. The following cases operated on in the Perth Hospital illustrate these principles of treatment:—



The cardinal ligaments (*c*, *c*) are looped on to the anterior uterine surface, the utero-vesical pouch having been opened and the bladder thrown down from the uterus. The loops (L, L) in the round ligaments correct retroversion, the internal muscular parts (M, M) of the ligaments being encroached upon as little as possible.

Case 1.—Mrs. B.; forty-eight years; ten children (youngest, twelve years). Irregular menstruation. The cervix projected over an inch outside the vulva on standing, and required to be shoved back to permit of sitting; it was lacerated and hypertrophied, while the external os and surrounding area was red and eroded. The cervix first protruded over two years earlier. There was marked cystocele as well as some rectocele, with diastasis of the levatores ani from an old perineal laceration. Supra-pubic abdominal coeliotomy was performed on the 9th July, 1913. The bladder was thrown down from the uterus, after breaking down adhesions of the bladder right up to the pundus uteri. In then separating the bladder from the uterus an adventitious cyst with smooth lining, and about 2 in. broad, was opened into. The attempt to dissect it off the uterus was partially abandoned because of free haemorrhage. The cardinal ligaments being then exposed were dissected off the posterior layer of the broad ligament, and looped up on the anterior wall of the uterus, to which they were sutured with silk. After taking a loop in each round ligament, the wound in the peritoneum was closed with a continuous catgut suture. The utero-sacral ligaments were so attenuated by stretching that they could not be certainly identified. On attempting to "manufacture" them by stitching the postero-lateral margin of the uterus to the peritoneum lateral to the rectum the stitches tore out, on account of the friability of the peritoneum in an obese person. The patient did well after operation, a striking feature being that in this case, as in subsequent ones, there was practically no post-operative shock. Three weeks later large wedges were removed from the hypertrophied cervix, a procedure which proved difficult, from the impossibility of drawing the uterus far down the vagina without using undue force. At the same sitting anterior colporrhaphy and colpo-perinaeorrhaphy were carried out. The final result was all that could be desired; the uterus, being normal in size, fixed well up in the pelvis in its normal anteverted position, and the patient feeling unusually well. Recently I saw her looking splendid, menstruating regularly, and about to set out to confine her daughter.

Case 2.—Mrs. W.; forty years; three children (youngest, three months). Procident uterus for last two years reaches vulva after exertion. Lacerated perineum (unrepaired) at first confinement four years ago. The abdomen was opened, after curettage, on the 10th September, 1913. Looping of the cardinal ligaments and of the round was carried out as in case 1, thus placing the uterus in its normal position in the pelvis. Finally, there was nothing to show that an operation had been performed in the abdomen except a 2 in. suture-line in the utero-vesical fold of peritoneum, and this could only be seen when the fundus uteri was pulled backwards. A fortnight later the diastasis of the levatores ani was remedied by a perinaeorrhaphy, and the patient left hospital restored to a normal condition as far as examination could show.

Case 3.—Mrs. R.; forty-six years; ten children (youngest, seven years). Some metrorrhagia. For the last two years the cervix uteri had projected for about 1 in. after any physical exertion. It was much hypertrophied, and there was erosion around the external os. There was cystocele and rectocele, with marked diastasis of the levatores ani, the muscles having retracted almost to the bones. The uterus was a good deal enlarged, heavy, and congested, and by the abdomen was found to be oedematous. The patient looked much older than her age, was odentulous, flabby, and nervous; the first heart-sound at the apex was weak, and the aortic second sound accentuated. On the 27th October, 1913, after curettage and removal of wedges from the cervix, the abdomen was opened and looping of the cardinal and round ligaments carried out, the uterus being thus restored to its normal position in the pelvis. The patient's condition caused anxiety to the anaesthetist, so that she was never completely under the "open ether" administered, thus rendering the operation very difficult and unduly prolonged. In spite of this, the patient showed practically no evidence of post-operative shock, and made little complaint of pain. In this and case 2 the upper free margins of the superior heads of the cardinals were beautifully defined. Some weeks later the cystocele was found to have greatly diminished, so that only the diastasis of the levatores ani was dealt with, and finally the patient left hospital completely restored.

Case 5.—Mrs. C. W. ; twenty-nine years ; married five years ; three children (last, aged nine months). No miscarriages, menorrhagia. She complained of the uterus "coming outside" for the last eight months. On examination the cervix uteri was found markedly hypertrophied, ulcerated from friction, and cutaneous from long exposure to the external air. With a very trifling pull a vulsellum drew the cervix about 2½ in. out from the vagina, and demonstrated marked cystocele, together with rectocele, and associated diastasis of the levatores ani. The uterus was curetted, and large wedges excised from the cervix. A fortnight later—25th November, 1913—the abdomen was opened, and the cardinal and round ligaments looped. On immediate examination in the lithotomy position the uterus was found to be beautifully fixed in its normal position in the pelvis, the firm fixation being demonstrated by pulling on the sutures which had been used in excision of the cervical wedges. It was also noted that the cystocele and rectocele were much less pronounced. No further operation was done at this sitting because of the presence of a small abscess about the vulva, and, unfortunately, the patient declined a suggested perinaeorrhaphy. When she left hospital, however, the uterus was in perfect position.

Case 4 hardly calls for description, as it is merely a repetition of the remarkable success of the other cases.

As to the above operation of intra-abdominal looping of the cardinal ligaments, I trust other surgeons may be encouraged to give it a trial. Certainly it is not an operation to be lightly undertaken, but once the anatomy of the uterine vessels and of the ureter is clearly grasped the danger is greatly minimized. If the operation, with a gradually perfected technique, turns out to be all that I anticipate, it should greatly advance the treatment of uterine prolapse. Its more striking advantages are : (1) The practical absence of haemorrhage ; (2) the excellent immediate anatomical result, and almost certain good permanent effect ; (3) the comparative absence of post-operative shock ; and (4) the absence of raw surfaces.

NOTE.—A carefully dissected uterus, with the bladder thrown down carrying the ureter with it and exposing the isolated cardinal ligaments, was exhibited to illustrate the operation.

A SIMPLE AND SUCCESSFUL OPERATION FOR ANTI- AND RETRO-DEVIATIONS OF UTERUS.

By L. Clarke Webster, L.R.C.S. and P. (Edin.).

Gentlemen,—To the gynaecologist, one of the things in his profession which must cause disappointment is the very few real successes he obtains from the various operations devised for the replacement of a misplaced uterus, and for the cure of the many phenomena associated therewith. Granted that in many cases the malposition is corrected, yet in a very large percentage of cases one finds very little permanent benefit resulting to the numerous reflex and other troubles associated with uterine misplacements. The most common methods of dealing with these displacements seem, from the reports and discussions which take place from time to time, to be, on the whole, unsatisfactory. A most instructive paper appeared in the *Australian Medical Journal* of the 30th December, 1911, on "Surgical Treatment of Uterine Retro-displacements, with Results of Operations," by Dr. Norman McArthur, Senior Gynaecological Surgeon to St. Vincent's Hospital, Melbourne. He says, *inter alia,* "As yet the only satisfactory methods are surgical. . . . But there are many disappointments in all surgical methods. . . . If gynaecological surgeons doubt this statement, I recommend them to do as I did—call in and examine all hospital patients for the last six years, and note the after-results of operating. . . . I have *no faith in vaginal methods* of replacing retroposed uteri."

About four years ago I had occasion to do a posterior colporrophy on a patient of mine, in order to explore her uterine adnexa, more especially the R. ovary and tube. At a previous examination I could feel the R. ovary enlarged and tender, and the uterus was retroflexed. I found, on operating, a cyst as large as an orange on the R. ovary. I incised the cyst, curetted the uterus, and packed the pouch of Douglas with gauze every day till the wound healed. I was surprised to find on examination three months later that the uterus was now in normal position; and, moreover, the patient was quite free from all her former symptoms. I had instituted no other treatment for uterine condition except giving patient exercises for the abdominal muscles.

The next case of retro-deviation I had I did posterior colporrophy again without any exploration, and packed as before. Result was the same as previous case. Next case I only snipped through the vaginal mucosa with a pair of scissors, packed for twelve hours, and again found a successful result. I next tried the same method for anti-deviations, and met with the same gratifying results. I have now done over fifty such cases, with the same uniformly good results. The improvement in the patient's health and appearance has been so remarkable in nearly all the cases that I feel I must place these results before you. At the outset, I do not know how to give the procedure a name, for it is hardly possible to dignify it by calling it an operation. The whole thing is so simple that I am afraid many of you will say that such trifling incision could not possibly accomplish what I claim for it. Gentlemen, you would all be perfectly justified in saying so. I would be inclined to make the same remark had I not seen its success demonstrated. I will first deal with the technique of the operation, which I have called "Clarke Webster" for the purposes of this paper.

For a retro-displacement I make an incision with scissors just through the vaginal mucosa about $\frac{1}{8}$ in. above its posterior insertion into the cervix. For anti-deviations I make a corresponding incision $\frac{1}{8}$ in. above the anterior insertion into the cervix. The incision is made transversely, its length depending on the degree of displacement. For example, for flexion of the uterus, forwards or backwards, I make the incision 1 in. long; for a version about $\frac{3}{4}$ in. is sufficient.

If patient has been suffering from dysmenorrhoea, with the pain just before the flow, I leave a No. 5. Hegar in uterus for twelve hours. I find this overcomes the tendency of the cervix to close down as tightly as before dialation. Since adopting this method I have had very little return of dysmenorrhoea in my cases. If the uterus is flexed I also leave a No. 5. Hegar in for twelve hours. This keeps the uterus straight, and it does not then return to its flexed position again. The incision on cervix will keep the uterus in normal position. After pushing uterus up into normal position and Hegar left in, it is packed round with gauze, and gauze also is packed into whichever fornix the incision has been made. This assists also as a prop to prevent the kink returning. A hot vaginal douche with lysol is administered once daily for two months. The patient is kept in bed twelve to fourteen days; and just before letting her up I teach her the following abdominal exercises, which she is instructed she must keep up for three months to complete the cure: (1) Lying on back, to raise herself into a sitting position, and slowly lower herself back again; (2) lying flat on back, to raise legs (extended at the knees) right up over abdomen, and slowly back again; (3) lying on back, draw heels close up to buttocks and raise body on feet and shoulders as high as possible, and back again; (4) now resting on her elbows (with knees unbent), raising whole body on toes and elbows as high as possible, and down again. These exercises tone up the abdominal muscles as well as the uterine muscles and ligaments, and thus assists in the cure of the malposition.

In the few cases where the sacralgia has returned, the history has been that patient had to return to very heavy household duties immediately after leaving bed or hospital. It is just what one would expect to occur, seeing that nothing had been done to fix uterus at the time of operation.

A striking feature in most of my cases has been the manner in which they have put on weight and condition, and retained it.

Varieties of Displacements treated.—Thirteen retro-flexions, eighteen retroversions, nine anti-flexions, ten anti-versions: total, fifty.

Gentlemen, if you should be sceptical as to the results obtained by means of my simple procedure, I would ask of you to give it a fair trial. I feel sure that if you do so you will be very much more pleased than you are now over the results of a good many of your ventro-fixations and round-ligament operations.

STATISTICS OF CASES OF RETRO-DISPLACEMENTS OF THE UTERUS OPERATED ON AT THE LADY LAMINGTON HOSPITAL, BRISBANE.

Collected by A. G. Butler, B.A., M.B., B.C. (Cam.).

Total number of circulars issued	368
Returned through the dead-letter office	126
Circulars returned	146
Circulars not returned	96
	368

Operations performed—

Ventro-suspension	81
Intro-abdominal shortening	11
Gillam's operation	30
Montgomery modification	8
Alexander-Adams	4
Intro-abdomnial shortening with ventro-suspenison	4

Operations performed for (anatomically speaking)—

(1.) Simple retro-position of uterus.
(2.) Retro-position with relapse.
(3.) During other operations for purpose of support.

Total results—

Much improved	66
Improved	37
Not improved	20
Recurrences (as per examination)	15

Pregnancies—
Full time : 36 patients, 62 children.
Miscarriages : 13 patients, 20 pregnancies.
Single women and widows : 22 patients.

Pregnancies.

Operation.	Much Improved.	Improved.	Not Improved.	Recurrences (Examinations).	Full Time.	Distocia.	Miscarriages
Ventro-suspension (81 cases) (13 single and widows)	41	19	9	12=15 %	23	Forceps, 3 Born dead, 2 Haemorrhage, 1 Long labour, 2	8=26%
Intra-abdominal shortening of round ligaments (11 cases) (2 single)	4	4	2	1	1	..	..
Intra-abdominal shortening and ventro-suspension (4 cases)	3	..	..	1	3	..	1
Ventro-fixation	1	1	..	..	..	..	..
Gilliam's shortening of round ligaments (30 cases) (7 single)	11	10	8	1=3%	8	Forceps, 1 ..	4=31%
Montgomery's mod. of Gilliam (8 cases) (1 single)	5	2	1	..	1	..	..
Alexander-Adams (4 cases)	2	2	..	..	1	Long labour	..
McKenzie	1	..	..	1	..	..	..

STATISTICS OF CASES OF RETRO-DISPLACEMENTS OF THE UTERUS, ETC.—*continued.*

Operation.	Date.	Result.	Pregnancies.	Dystocia.	Miscarriages.
Int. abd. short.	Co 1/3/09	Very much improved ; gained 2 stone ; slight pain at ⊙ ; P.V. ut. anteverted	0	..	0
Vent. sus.	F 2/7/12	Much improved ; P.V. ut. normal posit. movable	..	..	..
Montg. susp.	W 13/2/12	Certainly better, but sick feeling on stooping	Single	..	..
?	B 18/1/10	Better health, very little dysm.	1 (2 yr. old) *bbc*	..	0
?	W 21/10/12	Much better, but pain and irreg. at ⊙	0	..	0
?	W 7/11/12	Better health	0	..	0
Ventro-fix.	Co 29/3/09	Decidedly better ; very satisfactory	5	..	..
Int. abd. short.	Co 13/7/09	Much worse	5	..	..
Gilliam	L 16/7/12	Marked improvement ; P.V. ut. anteflex movable	0	..	..
..	Br 8/7/12	Marked improvement	6 mos. preg.	..	..
,,	Hd 11/7/12	Not much better ; pain in back at night	1 (25/6/13)	None	..
Vent. susp.	Hd 12/2/12	Better for 1 year ; old sympt. recurred	0	..	0
,,	Hd 23/2/12	Very good ; no discomfort whatever	S	..	..
Ventro-fix.	He 14/10/09	Perfectly well after 40 years of suffering	..	..	..
Alex.-Adams	He 27/1/10	Better since birth of child	1 (10/4/11)	No	0
Ventro-fix.	He 25/8/11	No discomfort ; health good	1 (1/1/13)	Long labour	0 (not listed).
Vent. susp.	He 2/19/06	A little better	0	..	0
,,	L 15/3/09	Much better till conf., and now bearing down and backache. P.V. ut. good position ; abd. wall much relaxed	1	Forceps	0
,,	He 5/3/08	Much better ; some pain in left side	1 (7 mos., stillborn)	No labour	1
,,	He 8/1902	Much better ; no prolapse now ; P.V. vag. repair excellent ; ut. low ; vent. hernia	0	..	0
,,	He 6/1904	Good ; nothing to complain of	S	..	..

Operation.	Date.	Result.	Pregnancies.	Dystocia.	Miscarriages.
Vent. susp.	He 6/4/08	Gen. health better; still backache constantly. P.V. enlarged; reporrated; fundus fixed; tender	1 (July, 1909)	No	0
,,	He 3/12/07	Wonderfully better; a little pain from rt. ovary	1	No	0
,,	He 28/10/09	Much better; no discomforts	S	..	..
McKenzie susp.	He 26/4/10	Better for 8 mos.; now pain has returned	0	..	0
,,	He 7/4/10	No better; same suffering and backache now	0	..	0
Int. abd. short.	Co 3/5/06	Married 3 years; ⊙ great pain; Dr. Taylor reports womb out of place	0	..	..
Vent. susp..	Co 22/11/09	Much better; no discomfort	0	..	0
,,	Co 3/1903	Better health, but a good deal of backache	Widow	..	0 (not listed).
,,	Co 2/5/10	Health greatly improved	Awaiting confinement	..	0
,,	Co 9/4/07	Health better	0	..	0
,,	Co 8/8/10	Much better	0	..	0
Vent. susp. and ovariot	Co 20/6/07	Better	2	No	0
Int. abd. short.	Co 13/1/08	Dysmen. less	0	..	0
Vent. susp.	Co 8/1901	Better; no discomfort	3 (3/6/13)	..	5
Alex.-Adams	Co 24/4/11	Better at ⊙, but dragging pain always; P.V. ut. in good position	0	..	0
Vent. susp.	Co 11/1903	Dys. better; gained 2·3 stones; still leucorrh.; P.V. ut. anteflex	0	..	0
,,	Co 7/1905	Well for a few months; required further op.	0	..	0
Int. abd. short.	Co 20/8/06	No difference, sterility; P.V. conical cervix; anteflexed; scar drawn in	0	..	0
Vent. susp.	Co 7/8/06	No discomfort since; quite a new woman; P.V. ut. in good position	0	..	0
,,	Co 17/6/07	Op. was a failure; went to general hospital; cured with medicine	2	No	0
Int. abd. short.	Co 21/5/06	Splendid health since	1	No	0
Vent. susp.	Co 2/2/06	Slight improvement	1 (1907)	..	0

STATISTICS OF CASES OF RETRO-DISPLACEMENTS OF THE UTERUS, ETC.—*continued.*

Operation.	Date.	Result.	Pregnancies.	Dystocia.	Miscarriages.
Int. abd. short. ..	Co 26/5/09	Op. very successful; health much better	S	..	..
Vent. susp.	Co 11/4/10	No discomfort; health good; leucorrhoea	0	..	0
,, ...	Co 30/5/10	Better for 6 mos.; now same as before op.; bearing down; P.V. slight prolapse and crysto	0	..	0
Int. abd. short. and vent. susp.	Co 16/5/10	Better; pain and discharge not quite gone	0	..	0
Gilliam	Co 7/3/10	Still pain in R. side; leucorrhoea ..	0	..	0
Vent. susp.	Co 4/10/10	Thoroughly successful	S	..	..
,, ...	Co 24/10/10	Health very good	0	..	0
,, ...	Co 29/7/09	Better since; left leg and ankle swells at ⊙	0	..	0
,, ...	Co 8/6/08	Better for 12 mos.; now pain at ⊙; sick; P.V. ut. in good position; rt. ov. enlarged; band in left fornix	S	..	..
Int. abd. short. and vent. susp.	Co 3/5/09	Better	0	..	0
Vent. susp.	Co 28/3/04	Much better	1	P.P.H.	0
,, ...	Co 28/11/10	Better	0	..	0
,, ...	Co 21/2/03	No better; married since	3 (twins and 1)	No	0
,, ...	Co 10/3/03	Much better for 3 years till next birth; now prolapsed and incont. of urine as before; leucorrhoea	2 (and $8\frac{1}{2}$ mos. preg. =3)	No	0
,, ...	Co 11/4/03	Better; no ill-effects	0	..	0
,, ...	Co 27/3/05	Much better	S	..	..
,, ...	Co 11/1901	Improved (one ovary removed at op.)	3	1st, long labour, chd.3	1 (not listed).
Alex.-Adams	He 11/5/03	Better health	2	None	0
Vent. susp.	Co 31/10/10	No better; afterwards both ovaries removed; still ailing	S	..	..
,, ...	Co 5/3/07	Excellent	S	..	..
,, ...	Co 5/8/03	Better; still has headaches and backache; P.V. ut. normal in position and mobility	2	None	0

Operation.	Date.	Result.	Pregnancies.	Dystocia.	Miscarriages.
Vent. susp.	Co 10/9/03	Prolapse worse since op. and before birth of next child. P.V. ut. anteflexed ; perin. only fair	2	Forceps	0
Int. abd. short. vent. susp.	Co 12/10/08	Much better since	0	..	0
Vent. susp.	Co 28/4/08	Better	3 (1 stillborn)	No	0
Vent. susp., ooph. and sacp.	Co 24/10/07	Better for 1 year ; now womb fallen again ; same as before ; married since (2 years)	1	..	0
Int. abd. short., vent. susp.	Co 10/9/07	Better since op. ; married since ..	2	No	0
Int. abd. short. ..	Co 13/6/07	Better, but still bad pain at ⊙ ; married 2 years	0	..	0
,, ..	Co 27/5/07	Much better ; no discomfort since ..	1	2 days' labour	0
Vent. susp., left oöphored	Co 25/6/07	Improved	0	..	0
Int. abd. short., vent. susp.	Co 18/12/06	Much better ; still backache ..	1	No	0
Vent. susp.	Co 22/11/06	Better	0	..	0
Int. abd. short., vent. susp.	Co 19/11/06	Better ; displacement recurred (Dr. McEvoy)	0	..	1
Vent. susp.	Co 6/11/06	Better ; incis. hernia (small) ..	0	..	0
,, ...	Co 11/10/09	No better ; op. again in Dec. 1911 ..	1/2/13	$CHCl_3$	0
Mont. susp.	W 20/5/12	Better	0	..	0
?	W 15/4/12	Much better	0	..	0
Vent. susp. and rt. ligts. fixed over ex. recs.	W 16/8/10	Still backache and leuc. ; headaches better	0	..	1
Vent. susp.	W 21/2/11	Not better ; sacral pain ; bearing down ; dys. not much better ; headaches better	0	..	0
Mont. susp.	W 26/2/12	No better ; required further treatment	0	..	0
Vent. susp.	W 8/2/12	Much better till last 2 mos. ..	0	..	0
Mont. susp. left ovariot. .	W 25/1/12	Much better till lately	?	..	?
Vent. susp., D. and C. per. trach.	W 10/8/11	Better	0	..	0
Gilliam's susp. ..	L 17/5/10	Much better	? (Not living with husband)	..	?

Statistics of Cases of Retro-displacements of the Uterus, etc.—*continued.*

Operation.		Date.	Result.	Pregnancies.	Dystocia.	Miscarriages.
Vent. susp. and salp.	L	23/4/12	About the same (syphilitic)	0	..	0
Alex.-Adams	L	26/3/12	Much the same, dysm.; P.V. ut. in good position	0	..	0
Vent. susp.	L	12/5/11	Very much better; all symptoms relieved	0	..	0
Gilliam	L	25/4/11	Still backache and dysmen.	0	..	0
Vent. susp. and peri.	L	8/6/11	Very well until 2 mos. ago; slight prolapse	1 (25/11/12)	No	0
Gilliam	L	24/10/11	Backache and dysmen, still; spinal curvature	S	..	..
?	L	31/5/04	Better in many ways; now some bladder-trouble	0	..	0
Vent. susp.	L	25/1/06	Good since op.	3	No	0
,,	L	2/1/06	Much better; felt a new woman since op.	0	..	0
Gilliam	L	23/2/06	Not better for 2 years; now well	0	..	0
Vent. susp.	L	18/11/02	Much better, but still pain in left side	0	..	0
,,	L	2/3/11	Considerably better	1	No	0
,,	L	16/10/03	Much better till after 1st chd., when incis. hernia formed	3	No	2
,,	L	16/10/03	Much better	0	..	1
,,	L	19/9/04	Died 5 years after of apoplexy; no record of ut. condition	..	..	..
,,	L	16/11/04	Much better	0	..	0
Gilliam	L	23/11/08	Better, but headache and backache at ⊙	0	..	2
,,	L	11/11/09	Very much better	1 (10/7/12)	No	..
,,	L	29/4/09	Much better	1 (Oct. 12)	No	0
,,	L	23/3/09	Much better till 5 mos. ago; now dysm. again; P.V. ut. anteflexed; form tender	S	..	..
,,	L	10/6/09	Much the same as before op.	0	..	0
Vent. susp., R. tube and ov. removed	L	21/12/09	Much better; slight bulging at lower end of wound on coughing; P.V. ut. normal in position; left ovary large	0	..	0

Operation.	Date.	Result.	Pregnancies.	Dystocia.	Miscarriages.
Gilliam	L 28/7/09	Much relief since op.	S	..	..
Vent. susp.	L 29/9/10	Better	4½ mos. preg.	..	0
Gilliam	L 10/2/10	Not relieved; still pain in side	1	Induced at 8th mo. (chd. alive)	1
Vent. susp.	L 20/9/10	Ut. symptoms relieves; since dead of nephritis	S	..	..
Gilliam	L 3/5/10	Not relieved	S	..	..
,,	L 24/2/10	Quite well for 22 mos., then ectopic (Nov. 11); P.V. ut. forward; movable; general health good; since then admitted for ectopic; now well (Dec. 13)	2	Ectopic	..
,,	L 8/4/10	Pains all disappeared	0	..	0
Vent. susp.	Ca 14/8/11	?	0	..	0
,,	Ca 12/1/12	Much better; great pain at times	0	..	0
Gilliam	Ca 23/7/12	No improvement; great pain in right side, and worse now	Widow	..	0
Gilliam and trach.	Ca 29/2/12	Better	0	..	1
Gilliam	Ca 22/2/12	Better in every way	1	No	0
,,	Ca 20/6/12	Better till Jan., 1913, when old trouble returned	0	..	0
Vent. susp.	Ca 2/2/11	Still has discomfort	0	..	0
Vent. fix.	Ca 19/7/10	Displacement still occurs with prolapse	0	..	0
Gilliam	Ca 2/11/11	Prolapse much better, but ant. vag. is all much relaxed	S	..	..
,,	Ca 23/1/12	Very well since op.	1 (Aug., 1913)	No	0
,,	Ca 5/2/12	Not relieved; still dysmenorrhoea	S	..	0
Vent. susp.	Ca 15/6/10	Not relieved; required further op. (March, 1912)	Twins	No	0
,,	Ca 25/7/10	Not relieved; pain in stomach and backache at ⊙	S	..	..
Gilliam	Ca 5/4/10	Much better; lump in site of scar; since married; relaxed vag. outlet; ut. movable; incisioned hernia	1 (13 mos. old); now preg.	Forceps version	0

STATISTICS OF CASES OF RETRO-DISPLACEMENTS OF THE UTERUS, ETC.—*continued.*

Operation.	Date.	Result.	Pregnancies.	Dystocia.	Miscarriages.
Vent. susp.	Ba 19/6/06	Better for 2 years; now slight prolapse	0	..	0
Vent. susp., perin. colp.	Ba 28/2/05	No trouble with womb since op.; has had bladder-trouble two years ago	0	..	0
Vent. fix.	Ba 25/8/06	Much better, but some prolapse occasionally; P.V. cervix presents at vag. orifice	0	..	0
Vent. susp.	By 3/5/06	Better	0	..	0
,,	By 11/5/04	,,	S	..	2
Vent. susp., perin.	By 18/7/07	Very much better; splendid health since op.	1 (3 yrs.)	Long labour; forceps	..
Vent. susp.	Co 30/7/02	Better	0	..	0
,,	By 1/1903	Better; died 2 or 3 days after op., after conf. (Feb. 20, 1904)	1 (7 mos., Feb., 1904)	..	0 (not listed).
Vent. susp. ovar.	By 29/4/03	Better for 6 years; bearing down and backache returned; op. again 27/6/10	0	..	0
Vent. susp.	By 1/1903	Very much better	0	..	0 (not listed).
,,	By 28/4/03	Much better	S	..	..
Vent. susp., R. oöph.	By 20/5/04	Slight improvement	0	..	0
Vent. susp.	By 5/1/09	Improved as to bearing down, but still backache and leuc.	0	..	0
,,	By 11/5/09	Much better	0	..	2 (at 6 weeks).
,,	By 12/1/09	Much improved; pains disappeared; P.V. ut. retroverted slightly; cervix points downward	1	Forceps	0
,,	By 7/10/09	Better till 3 mos. ago; P.V. ut. retroflexed; cervix points downward	0	..	0
,,	By 2/1905	Great deal better	0	..	0 (not listed).

DISCUSSION ON "THE OPERATIVE TREATMENT OF RETRO-DISPLACEMENT OF THE UTERUS."

Dr. J. A. G. Hamilton (Adelaide) said he considered Alexander's operation the ideal one for retro-displacement of the uterus, but it had a limited field of usefulness: it can only be used with success in uncomplicated cases of displacement. During the last five years he had performed seventy-five Alexander operations, with four failures. Some years ago he had used Howard Kelly's ventro-suspension operation in a large number of cases, but he never felt satisfied that it was an ideal procedure. One never knows what is going to happen after ventro-suspension, and relapses, especially after pregnancy, are much too frequent. He had occasion to reopen the abdomen in twenty-eight cases after this operation, either for recurrence of the trouble or some further pelvic trouble; in some cases he found the uterus held by a firm broad band, suggestive of trouble during pregnancy; in others a long thin ligament was found, 3 in. or 4 in. long, apparently taking no active part in keeping the uterus in position, and give one the idea it might at any time cause intestinal obstruction; whilst in other cases the band had entirely disappeared, and the uterus was lying back in its former faulty position.

The peritoneum is not a reliable structure for surgical reconstruction, but the round ligaments, being composed of muscular fibre derived from the uterine wall, undergo, with the physiological changes incidental to child-bearing, evolution during gestation and involution after labour. This feature in the round ligaments supply the only possibility of permanent cure for retro-displacements, for all fixations and bands of a peritoneal or other source have no capacity to retract after labour.

He had operated by Gilliam's method, and its modifications by Montgomery and Mayo. He had three objections to this method of operating for retro-displacements—(1.) The uterus is raised out of the pelvis and suspended against the abdominal wall. (2.) The weight of the uterus is entirely dependent for its support on the longitudinal pull on the round ligaments, and the uterus is suspended in a horizontal position rather than in the normal position of ante-flexion, so that the intra-abdominal pressure does not come freely on the posterior aspect of the uterus as it should, to preserve its forward position. (3.) There is a grave risk of damaging the deep epigastric vessels in operating by any of the above methods; this accident happened to him once.

For the last eight years he had used almost exclusively the Baldy operation for retro-displacements. In this operation the round ligament is brought through an opening in the broad ligament and fastened to the back of the uterus. He had found that it was necessary to use chromic gut or silk for suturing the ligaments, to make certain of their remaining in position. In this operation the uterus remains mobile in its normal position in the pelvis. The uterus is lifted up and sustained by the encircling round ligaments. Not only is the uterus sustained in a forward position by this sling at the back, but the force of the fundus against the encircling round ligaments causes a pull on the ligaments at their attachments to the anterior uterine wall, and the harder the pull the more the tendency to draw the top of the fundus forward. Another advantage of this operation: it makes certain of permanently elevating the Fallopian tubes and ovaries, and if the round ligament is placed in the proper position through the broad ligament it cannot interfere with the blood-supply of the tube. He had performed this operation 237 times, and only knew of three failures, and in these the relapse was probably due to using plain iodine catgut instead of some non-absorbable material. Dr. Stewart had raised an objection to Gilliam's operation on account of danger in subsequent pregnancy; but there was no danger in pregnancy after any operation which used the round ligaments to correct malpositions of the uterus. They were the only supports of the uterus which had the power of stretching during gestation and involuting after labour; so that there was no danger of this interfering with the normal expansion of the pregnant uterus.

He would like to congratulate Dr. Nyulasy on the very instructive and carefully prepared paper in which he had brought a very ingenious operation for prolapse of the uterus before this section. Prolapse of the uterus generally called for operative treatment in women after the menopause, and in these cases any simple operation which kept the uterus out of the pelvis after repair of the pelvic floor generally sufficed. Dr. Nyulasy's operation seemed to him rather an extensive one, and, on account of its proximity to large vessels and the ureters, a difficult one to perform. He preferred a simpler method of procedure. Lately in prolapse after repairs of the pelvic floors he made a small median abdominal opening, placed a chromic suture round the round ligaments close to the uterus, passing the suture through the rectus muscle close to the edge of the median incision, and fixing them there. In some cases this was supplemented by a ventro-fixation.

Dr. J. MacNaughtan Christie (Wellington) said,—In speaking of retro-uterine displacements, I include retroversion and retro-flexion. A certain proportion of cases met with require no treatment. One sometimes finds a retro-deviation which is giving rise to no symptoms—especially is this the case in congenital cases. If one comes across a case of this sort it should not be left alone.

In young unmarried women local treatment should be avoided, unless the symptoms are very marked and cannot be relieved by other means. I have at present under treatment a very neurotic young woman in whom marked sexual excitement was set up by having vaginal douches used under the direction of her medical attendant.

In sterile women the uterus ought to be replaced, even if no symptoms are present. In my student days one was taught that a woman with retro-flexion would not become pregnant. That, of course, is not the case. There is no doubt that a woman with a retro-deviation is not so liable to become pregnant, and if she does there is some risk of incarceration.

The other class of cases requiring treatment are those in which there is also prolapse of the uterus, or where there are adhesions or prolapse of the ovaries or tubes.

Treatment may be divided into the use of pessaries and operation. The object of any treatment is to reduce the displacement and retain the uterus in its proper position. I am against the use of pessaries in young unmarried women, and consider that if something has to be done for the retro-deviation it should practically always be operative.

It is sometimes necessary before attempting to replace the uterus to carry out preparatory treatment. This consists in rest in bed for about a week, hot vaginal douches, tampons of glycerine or ichthyol and glycerine, and saline purgatives. In some cases also one has to give an anaesthetic, so as to ease the pain and relax the muscles, and thus facilitate replacement. Under an anaesthetic it is nearly always possible to replace the uterus manually. If not, then one can use the sound. Repositors I have no experience of. Having replaced the uterus, one has to maintain it in its proper position. Tampons of wool or sponge for this purpose are useless, besides being filthy: a pessary is bad enough. If one is going to use a pessary, a Hodge, Thomas, or Smith will be found most suitable. See that the pessary fits the patient. It is best to use some material which can be moulded, as pessaries sold have usually far too small a posterior curve. One with a marked posterior curve seems to me to support the uterus better, and to be more comfortable for the patient. If the pessary gives rise to any pain it does not fit, or the uterus is being pulled back by some adhesions about it or the appendages. If the vaginal walls and uterine supports are very lax, or if the pessary is too short, it is quite possible for the body of the uterus to fall back over the top of the instrument into the pouch of Douglas. A pessary should be looked upon as a temporary expedient only.

A certain proportion of cases (probably a very small proportion) can be cured by pessaries in from three to twelve months. If at the end of twelve months the uterus will not remain anteverted after the pessary is removed, then operative treatment should be adopted. It is absolutely useless—in fact, worse than useless—to use a pessary if the uterus cannot be properly replaced. I mean that to partly replace it and expect the pessary to do the rest is absolutely bad treatment. Sometimes one can replace the uterus, but it falls back again. This is probably due to adhesions or to a relaxed condition of the pelvic floor, and is a distinct contra-indication to the use of pessaries. The adhesions may be either tubal, ovarian, or uterine. If the retro-deviation is irreducible, operative measures must be used. Operative methods divide themselves into shortening of the round ligaments or fixing the uterus to some part of the abdominal wall. There are many methods of shortening the round ligaments. It may be done either extra- or intra-peritoneally. The extra-peritoneal, or Alexander-Adams operation, is excellent if one is certain that there are no adhesions, and if the uterus is not large and heavy from old endometritis or fibroids. If one cannot be certain about it, then avoid this operation, and open the peritoneal cavity either abdominally or per vaginam. The objection I have heard raised against the Alexander-Adams operation is that one gets the round ligaments at their weakest part. This objection is more theoretical than real, as it is extremely seldom that the ligaments are not strong enough to retain the uterus in its proper position. In the intra-peritoneal method one can shorten the round ligaments in many different ways, such as looping them and pulling them through the anterior abdominal wall, or through the external abdominal ring; folding them on themselves, and so reducing their length; looping them, and fixing them to the posterior surface of the uterus; taking them either above the Fallopian tubes, or by piercing the broad ligament below the Fallopian tubes, and drawing them through the opening. Shortening of the utero-sacral ligaments, preferably per vaginam, has been recommended, but I have no experience of it. The other method of operating consists in attaching the uterus to the abdominal wall. The attachment may be either a fixation or suspension. Ventro-fixation should never be used during the child-bearing period. Ventro-suspension does not offer the same objections, but I do not like the technique as recommended by Kelly—namely, to pass the sutures through the posterior uterine wall. I believe this is apt to be followed by dystocia. On the other hand, as Kelly points out, if they are passed through the anterior wall, the intra-abdominal pressure is apt to drive the uterus back and cause an elongation of the peritoneal bands, and so relapse. I have had a case of this sort where the bands were about 7 in. or 8 in. long. Vaginal suspension, so much used by Dührssen, avoids the bad points in ventro-fixation or ventro-suspension. Any of the above methods of operating should be supplemented by anterior colporrhaphy and perinaeorrhaphy if there is laxness of the vaginal walls or a lax or ruptured perineum. If this is not attended to, then it is not worth while doing the other operations, as relapse will most certainly follow in a very large proportion of the cases. Many also require curettage.

To sum up I would say, use a pessary if the patient is very anxious to have it tried, if she will submit to all the trouble of it, and if the uterus can be easily replaced and there is no disease of the appendages and no adhesions. If with the same conditions in the pelvis one is going to operate, do an Alexander-Adams. If there is any trouble in replacing the uterus on account of adhesions, or if there is any suspicion of disease of the appendages, open the peritoneal cavity, do what is necessary to the uterus, tubes, or ovaries, and suspend the uterus by Gilliam's method. If the patient is not a very good subject for an abdominal operation, or objects to it for aesthetic or other reasons, then do a vaginal section and vaginal suspension.

Mr. TRACY INGLIS (Auckland) stated that he had made an attempt to trace the results of 178 cases on which he had operated for retro-displacements, with the following results: Ventro-suspension, thirty cases, ten failures, ten not traced; Alexander's operation, fifty-six cases, one failure, twenty-two not traced; transverse incision and Alexander's operation, sixty-eight cases, no failures, thirty-six not traced; Baldy's operation, twenty-four cases, one failure, thirteen not traced. In sixty-eight of the above he had used a transverse incision just above the pubes, and separating vertically between the recti muscles, explored the abdominal cavity, and then shortened the ligaments as in an Alexander's operation. He claimed that with this one incision he could explore the abdomen, free any adhesions, or, if necessary, remove a tube, ovary, or appendix, and at the same time do an Alexander operation which, in his opinion, was in the majority of cases the most satisfactory method of remedying a retro-displacement. He had quite given up either ventral-suspension or fixation, except the latter, possibly, in women after the menopause. In the last three years at St. Helens Hospital, Auckland, he had treated four cases of dystocia after ventral fixation. In the above series of sixty-eight cases he had subsequently confined nineteen, all of which had perfectly normal confinements. He had listened with interest to Dr. Nyulasy's account of a new operation; but personally he thought it was too extensive an operation for the condition, especially as there were so many simpler operations to choose from. He considered that there would be a danger of damaging the blood-supply of the ureter in the pelvis, and consequently getting sloughing of the ureter near the bladder. He had had very good results with Baldy's operation in cases in which he did not think an Alexander would be successful.

Dr. WORRALL said it was inconceivable that the procedure described by Dr. Webster could have any effect whatever, except that arising from suggestion. Dr. Nyulasy's operation was in a region highly important and dangerous. All operators agreed that in Wertheim's operation the separation of the bladder should be done in the median line at first, and only laterally after the ureters had been isolated, so that in the probable event of the venous plexuses in the lateral regions being wounded they could be secured without endangering the ureters. In Dr. Nyulasy's operation the lateral regions were chiefly concerned in the operation, and venous plexuses could scarcely escape being wounded. He felt sure if the operation were generally adopted it would result in many deaths. This, taken in conjunction with the fact that it was done for a condition which did not threaten life, was sufficient to condemn it. Then, again, what the author called the cardinal ligaments seemed to him (Dr. Worrall) to be simply the unstriped muscle which Cunningham's anatomy described as chiefly constituting the base of each broad ligament. The author did not seem to have implicit faith in his own procedure, as he also carried out shortening the round and utero-sacral ligaments, so that it was difficult to say which procedure brought about any benefit resulting.

Professor WATSON (Adelaide) said that the cardinal ligaments, which played such an important role in Dr. Nyulasy's operation, received but scant notice in our anatomical text-books. In performing hysterectomy by either the abdominal or the vaginal route, these ligaments revealed themselves as cervico-vesical connections, limiting laterally the median plane of least resistance, into which the finger passes between the cervix uteri and vagina, behind and above the base of the bladder below or in front. They covered the terminal portion of the ureters and carried a number of cervico-vesical veins and a small artery. Often when the operator imagined he was separating the ureters in order to place them out of harm's way in performing a vaginal hysterectomy, in reality he was divaricating, and probably tearing the cardinal ligaments of Nyulasy, and unintentionally inundating the field of operation with blood. On account of their blood-supply and their contact relations with the ureters and bladder, whatever the merits of the operation might otherwise be, it was not one to recommend to the general practitioner or occasional operator, and he would not advise any of his female relations to submit to it, unless possibly Dr. Nyulasy himself was present to perform it.

Dr. FRANK NYULASY (Melbourne) thanked members for the great interest shown in the operation, but regretted the absence of the originator, who would have replied most effectively to every objection. He further regretted that during the reading of the paper itself Dr. Worrall was absent, and was only able to attend when the account of the last two cases was being read.

In regard to the alleged dangers, they will not be met with by the expert surgeon, and will not be encountered by even the average surgeon, when the technique is understood. This fact is well illustrated by the history of other operations, as, for instance, hysterectomy.

When this was first introduced the mortality was simply tragic, but when the genius of Stimson indicated clearly the points of attack—namely, the uterine and ovarian arteries—this operation soon became one of the most satisfactory in surgery, and in these days a simple hysterectomy is no more dangerous than a simple ovariotomy.

Arthur Nyulasy maintains emphatically that "the cardinal ligaments (in the base of the broad ligaments) are the main elements holding the uterus at a more or less definite level in the pelvis." And we know that in a vaginal hysterectomy, as soon as the bases of the broad ligaments have been divided, the uterus comes down quite easily to a much lower level, and this has been demonstrated over and over again in the cadaver. Looping of the round and utero-sacral ligaments are merely accessory to the essential operation of "looping the cardinals."

The comparison with Wertheim's operation is justified. A Wertheim is done for cancer in the cachectic subject, and involves the removal of deep-seated glands, with the surrounding parts often involved. Here removal must be attended by severe bleeding. In Nyulasy's operation you are merely looping up relaxed ligaments, and no parts are removed.

Again, Webster, Dudley, and others point out that owing to the failure of all other operations for bad cases of procidentia they have had to perform complete hysterectomy, a much more dangerous operation than Nyulasy's; but they insist that whenever the former is done the cut ends of the broad ligaments should be fixed into the upper ends of the vagina. They are thus really making use of the cardinal ligaments in a much less scientific way than Nyulasy does.

As Campbell, Professor of Clinical Anatomy in Long Island University, states, "The broad ligaments are attached to the sides of the pelvis, and suspend the uterus like a hammock"; and Fothergill says, "The uterus forms the central portion of a sort of swing-bridge, which crosses the pelvis from side to side." The cardinal ligaments lying in the base of the broad ligament having become greatly relaxed in the case of a procident uterus, are simply shortened up by Nyulasy in the lines of their normal axes, thus restoring the swing-bridge.

According to some critics, it is common-sense to shorten the relaxed round ligament, but apparently it is not common-sense to shorten the relaxed cardinal ligaments—which is, at least, inconsistent. I would here point out that in the Baldy and Webster operations, in shortening the round ligaments, you are putting out of action the strongest parts of those ligaments by attaching them behind the uterus, and then making the remainder of the ligaments a support for holding up ("cradling") the uterus, a function they were never intended to fulfil, and you are throwing the greatest strain upon the weakest parts (anterior ends) of the ligaments. In Nyulasy's operation, on the other hand, all the ligaments are merely shortened in the lines of their normal axes, a simple procedure which tends automatically to dispose of the complicating cystocele and rectocele at the same time.

Again, Nyulasy's operation may be contrasted with the procedures of Noble who does—(1) Curettage; (2) amputation of cervix; (3) anterior colporraphy combined with detachment of the bladder from the anterior surface of the cervix, and suture of vagina to the cervix as high as the internal os, so as to elevate the bladder; (4) perineorraphy; (5) suspensio uteri; and (6) in cases of complete prolapsus of uterus and vagina, shortening of the utero sacrals.

In regard to suspensio uteri, I need only remind you that Howard Kelly has given it up.

I may here remark that the bands referred to by Professor Watson are not precisely the cardinal ligaments described by Arthur Nyulasy, whose operation is obviously based on correct anatomical, physiological, and surgical principles, and is therefore the most scientific operation yet proposed for prolapsus and procidentia.

Finally, the objections to the operation are founded upon theoretical considerations by some who have never dissected out the ligaments nor performed the operation, as against the reasoned deliberate opinion of one who has done both; and, in conclusion, I am convinced that when Drs. Worrall and Hamilton have reconsidered the operation, the first operations of "looping the cardinals" in Sydney and Adelaide will be performed by those gentlemen.

Drs. Stewart, Clarence Read (New South Wales), Purchas (Auckland), and Agnes Bennett (Wellington) also joined in the discussion.

OVARIAN TRANSPLANTATION.

By George Thorne, M.A., M.D., Ch.B.,

Hon. Surgeon to the Women's Hospital, Melbourne.

It is now nearly twelve years since Brennan transplanted an ovary in the uterine fundus for menstrual epilepsy. During this period records of the operation have been accumulating, but there are still many questions to be answered.

My interest in the subject was awakened by the researches of my colleague, Dr. J. H. Nattrass, who proved, *inter alia*, that autoplastic ovarian grafts were practically always successful in producing corpora lutea, though a certain amount of ovarian tissue invariably degenerated. He showed that homoplastic grafts did in a large percentage of cases persist. He showed also conclusively that the presence of any remaining ovarian tissue in any animal effectually inhibited the growth of a graft. I have adopted his nomenclature, calling grafts from one individual to another of the same species "homoplastic," to another of a different species "heteroplastic."

The value of ovarian transplantation depends upon an appreciation of the ovarian secretion or secretions. Of these we still know but little, despite the investigation of Bayliss, Schafer, Starling, Marshall and Jolly, Swale Vincent, Osborne, Blair Bell, and a host of others. Iscovesco (Presse Med., Oct. 12th, 1912) perhaps made the furthest advance when he isolated an ovarian lipoid, and produced uterine congestion by its injection into another individual.

Our knowledge of the ovarian secretion in the human female is still largely derived from observation on those in whom the secretion is wanting, either from oöphorectomy, from atrophy of the organs, or from their congenital lack of development. We know that the removal of both ovaries is followed by atrophy of the muscular coats of the uterus. This was well demonstrated in a case quoted below (No. 1A). In this woman the ovaries had been removed at the age of twenty, and ten years later the uterus, on examination, was found to be of the pubescent or "infantile" type (as it is generally called), having a well-developed cervix with the small corpus.

Hegar and Krieger pointed out that at the menopause the normal course is first a degeneration of the Graafian follicles, and that this is followed by the uterine atrophy. Remembering this, the untoward symptoms which so often accompany the climacteric are very instructive.

Severe haemorrhages occurring at irregular periods are sometimes found. I have several times felt justified in performing hysterectomy, and found that in the ovaries isolated follicles had survived the general degeneration. The endometrium was usually thinned out, the muscular coats becoming fibrous, thus forming an insufficient guard to the increased flow. Even more frequently patients at the menopause complain of flushing and other vasomotor disturbances, which present a picture suggestive of excessive thyroid secretions. In these cases the atrophy of the thyroid, which generally progresses *pari passu* with that of the ovaries, was evidently delayed. This mutual interdependence of thyroid and ovarian secretions is well shown in a number of clinical features which I laid before the British Medical Association, Melbourne, in 1909.

The whole subject of the genital functions of the ductless glands was very fully illustrated in Blair Bell's Arris and Gale lectures of the 10th and 12th March, 1913.

The field of utility for the operation of ovarian transplantation is much wider than would at first appear. One has only to look through the records of any gynaecological hospital to find how often double oöphorectomy is performed. In most cases the condition of the Fallopian tubes precluded any possibility of future pregnancy. The sole reason, then, for leaving any ovarian tissue would be to conserve its internal secretions.

With total excision of both ovaries a storm-period is always experienced. The principal manifestations of this are similar to what one finds at the physiological menopause, but, as a rule, they are much exaggerated. Sometimes the mental depression is so marked as to constitute a really serious condition. Nor are the symptoms merely as temporary as patients are often optimistically assured. Of eighty-seven cases that I have been able to interview after five years, 15 per cent. still had marked flushings, whilst a much larger average had minor degrees of vasomotor disturbances. In three cases that I have had under my care these disturbances were sufficient to demand treatment ten years after the primary operation, one of them (No. 1A) mentioned below.

Assuming that Blair Bell's theory be correct—*i.e.*, that the functions of the ovarian secretion are, in its absence, taken over by other ductless glands—it would seem, then, that in double oöphorectomy so large and so sudden a demand is made upon these understudies for the ovaries that their output may never be able to overtake it. The total loss, therefore, of both ovaries may, apart from losing their reproductive functions, be looked upon as a calamity; and though in some cases it is the lesser of two evils, yet it is always an evil.

But neither is the alternative which has commonly been adopted fraught with safety or comfort. Until the last three years gynaecologists have sought, wherever it was possible, to leave the whole or part of an ovary. After hysterectomies for non-malignant disease the results of this procedure were wholly good ; and even when the smallest part of a resected ovary was left, the advantages of the ovarian secretion were manifest. It was in the much larger class of cases, where inflammatory conditions or adhesions were present, that the disadvantages of conservative surgery made themselves felt.

Before I adopted as a routine practice ovarian transplantation in all cases where the ovaries were involved in any but the slightest adhesions, I invariably endeavoured after resection to leave some ovarian tissue. The results were not satisfactory. As was to be expected, adhesions fixed the portions of ovary, and various pains—notably dyspareunia—often were sequelae.

A resected ovary that is left, especially where the greater portion of it is removed, undergoes proportionately considerable hypertrophy. It is in response to the demand for ovarian secretion, and is not found if one ovary be left and the other resected. The secreting organ calls for a large blood-supply, in which the neighbouring organs have their share, and a pelvic hyperaemia, where formerly there was a pelvic inflammation, is the outcome. Whether these be the reasons or not, it is clinically a fact that a large percentage of cases of resected ovaries are accompanied by pain. The proportion is difficult to estimate, and in my own patients I have seen but few. There are many instances in my notes, however, where I have been called upon to remove ovaries left by others. These others probably treated those left by me.

The third way, discarding excision and resection, is auto-transplantation, and it combines the good qualities of each with the disadvantages of neither. This, then, is the first and widest group of cases where ovarian transplantation is of value. The second group consists of those in whom it was formerly considered desirable to entirely remove the ovaries, on account of nervous manifestations associated with the menstrual period. As there is an unstable equilibrium presupposed in such patients, the shock of a suddenly imposed artificial menopause is theoretically unsound ; and clinical experience being so strongly in support of the theory, double oöphorectomy for these conditions has been generally abandoned.

No such objection obtains to the autoplastic transplantation. Brennan's historical operation quoted above is an instance of its success, and I am able to add two more very striking examples. The exact rationale of such success is difficult to explain, but it would seem that an excessive ovarian secretion was responsible for the symptoms, while the diminished and possibly gradually dwindling output was attended by no such untoward manifestations. As a method of treatment it must still be classed as more or less of an empiricism, but, clinically, benefit to the patient most certainly accrues.

No such doubt marks the utility of my third group. In these, ovaries had been removed or had atrophied, and the symptoms attending the production of the menopause unmistakably proclaimed the necessity for ovarian secretion. In many of these I have tried the exhibition of the extract, and similar ovarian and lutein preparations, but the results were seldom positive, and never persisted on the withdrawal of medication. Dr. Jeffreys Wood, of Melbourne, has recorded a case of congenital thyroid deficiency in which the persistent administration of thyroid extract induced ovarian activity in a woman at the age of thirty-three who had never menstruated.

I have never had the opportunity of dealing with a similar case, but in cases where the ovarian secretion has been abolished *after once being fully established* I have found the symptoms increased by thyroid extract ; and this is as would be expected. Homoplastic transplantation of the ovary offers a perfectly safe and moderately sure means of combating the deficiency of ovarian secretion. Even should the graft not persist more than a few months, yet this respite will enable the other ductless glands to adjust themselves to the demand put upon them.

Taking my first group of homoplastic cases, these are so interesting that I make no apology for quoting two of them *in extenso*. The other two have not been done long enough to justify conclusions being drawn from them.

No. 1A : Mrs. P. was thirty years of age when she consulted me. Both ovaries had been removed for dysmenorrhoea ten years previously ; she was single at the time, and had never suffered from pelvic inflammation, and, except for the dysmenorrhoea, menstruation had been normal. She consulted me for the severe flushings which had troubled her ever since the operation, and for the amenorrhoea that had been of the same duration. Her mother told me that she had been losing weight continuously, that she was always depressed, and that for twelve months periods of melancholy had come on that alarmed them as to her mental state. On examination I found that her weight was 6 st. 4 lb. The uterus was small and of the " infantile " type. The ovaries could not be palpated. Ovarian extract was administered, with negative results. On the 19th December, 1911, I operated upon her. From a patient at the Women's Hospital, upon whom I was performing *hysterectomy* for fibroids, an ovary was removed. This was put into Ringer's solution, and kept at a temperature of about 104° F. in a thermos flask. About an hour elapsed before it was conveyed to the second patient and grafted. The operation consisted in splitting the ovary and excising the stroma. The cortex was then sutured to the undersurface of the rectus muscle, which had been peeled back. The recovery from the operation was uneventful, and the ovary never caused any pain. On the 29th January following the patient reported that she had gained 1 st. in weight, and that the flushings had nearly ceased. In February she menstruated slightly, and again in March. Since then she has had the menstrual molimena at long intervals, but no sanguineous discharge. Her general health continues good, and her weight has now increased to 9 st. The flushings and depression have entirely disappeared. I believe that the absence of menstruation was caused by the atrophic condition of the uterus, which might with advantage have been intubated at the operation.

The second case (No. 2A), Miss J. C., was sent to me by Dr. Boyd. Her age was forty-eight, and she had had both ovaries removed five years previously. Since this operation menstruation had entirely ceased. Flushings had troubled her considerably, and she was always depressed. More recently she had had delusions. I took her to the Women's Hospital for observation during the few days previous to operation. She was very restless, especially at night, when she tried to get out of bed. She had also persistent delusions of persecution. An ovary from a woman of thirty-two was removed, and transplanted direct from one patient to the other. During the few minutes required to prepare the patient and make the incision, the ovary, attached to a piece of silk, was placed in the pouch of Douglas of the donor, whose wound was closed by my assistant. One-half of the ovary was sutured under the right rectus as before described. The other half was cut into fine slices or seedlings, and these were scattered on the undersurface of the left rectus. For a week her mental condition remained unaltered. After that it gradually improved, and when she left the hospital the restlessness had entirely gone; she did not appear, either, to have any delusions. Visiting her three weeks after her discharge from the hospital her sister reported that the condition was still satisfactory, but that two or three times when surprised by strangers she made rambling statements. The test of time is wanting in this case, and the result, though an improvement, is by no means so complete as in the first example.

No. 3A: Miss M. was sent to me by Dr. Groves. Her age was given as twenty-nine, and both her ovaries had been removed for dysmenorrhoea about four years before. She gave a history of melancholy and depression similar to that of No. 1A. The operation was the same as that described as performed on No. 2A. Although much improved, the time since the operation (six weeks) is too short to base any hopes upon.

No. 4A returned home from the hospital, and I am unable at present to get any history of the results of the operation, except that she is better, and will return to Melbourne and report.

The autoplastic transplantation includes two groups.

First, Group B, those in which the ovaries were removed because of mental disturbances, which were initiated or made worse at menstruation.

No. 1B: Mrs. G. was a widow, aged thirty-eight. For the past five years her menstrual periods had been associated with great excitement and considerable pain. In the interval she was inclined to be depressed, and was gradually relinquishing her occupations. She had lost flesh considerably, but I omitted to take her weight. In November, 1912, I performed an autoplastic transplantation, using the whole cortex, not seedlings. The result of the operation was good, in that her general condition improved and there were none of the unusual disagreeable concomitants of double oöphorectomy. Her medical attendant, however, reports that her nervous condition is not satisfactory. The menstrual history was interesting. Menstruation was absent for three months, but the periods returned, and occurred five times at normal intervals. After that they ceased. No flushings or other disagreeable symptoms were noticed.

No. 2B: Miss M. was aged forty-eight. I had considerable difficulty in getting an accurate history. For instance, her relatives assured me that there was no history of intemperance, whereas the medical attendant who saw her previous to my visits described her condition as definitely one of alcoholic insanity. When I saw her she had returned home from a private institution for the insane, where she had been for about twelve months. She was in a stuperose condition, which I was told had become continuous except when menstruation was present. She then became very noisy and disgusting in her language. Menstruation occurred at irregular intervals, having been thrice in four months previous to my operating upon her, but before that at much longer intervals. I placed her in a private hospital, and removed both ovaries, grafting one under the rectus muscle. At the end of ten days, for the first time for many months, she thought that she would like a book. After three weeks she was able to return home, and made a continuous recovery. In three months she was able to resume her work, and has now for more than eight months been managing a department in a large store. Menstruation occurred twice, and that but slightly. It was unattended by any excitement. There were never any vasomotor disturbances.

Group C consists of those cases in which it was considered advisable to remove the ovaries, but they were transplanted in order to conserve the secretions. I quote one typical case reported by my resident surgeon, Dr. McLorinan :—

" A woman, aged twenty-two, admitted as a threatened rupture of a L. tubal pregnancy. There was a history of two and a half years ago having been treated at the Alfred Hospital for a similar condition on the R. side and operated on immediately. She then had the right tube and ovary removed. The patient had had a child five years previously. She had been in a poor state of health for some time past. An operation was done as soon as possible, and it was found that the left tube and ovary were matted together with a mass of blood-clot from tubal abortion. Dr. Horne (who did the operation) found it impossible to separate the tube from the ovary, and he decided to do a left salpingo-oöphorectomy, but on account of the age of the patient a portion of the removed ovary was transplanted into the rectus muscle. There was no sign of any ovarian tissue on the right side. The patient made a good recovery, and the wound healed by first intention. She had not menstruated before leaving the hospital, but showed no signs of artificial menopause. Four months later the patient reported that she had had four menstrual periods, painless, lasting about three to four days, and perfectly normal in character. She looked well, and felt very much better. Her state of health was much better than it had been for some time past. The operation was evidently completely satisfactory, and the graft had taken well."

Vasomotor Disturbances.—These were absent in twenty-two cases. In one of the three in which flushings occurred after the operation suppuration took place in the wound. A double pyosalpinx had been dealt with, and I think the wound became contaminated during operation. In doubtful cases I now paint with iodine those ovaries that might infect the transplantation area, and reject the external surface when cutting seedlings from them.

Menstruation.—This came on in twenty-one cases. In eight it ceased after four or a less number of periods, occurring within six months of the operation. This record may be increased by those who have not yet been six months operated upon. Of the remainder, in three it has continued more or less regularly for six months, in one for nine months, and in two for more than twelve months.

It will be objected that some ovarian tissue may have been left; but during recent years I have never failed to produce a complete menopause when electing to perform a double oöpherectomy.

The results of changing this procedure for ovarian transplantation have been that the patients have most of them escaped the discomforts attending the sudden withdrawal of the ovarian secretion, and in no case have the evils attending an incomplete operation been experienced.

VENEREAL DISEASES AS THEY AFFECT WOMEN.

By Tracy Inglis, M.B., Ch.B.,
Medical Superintendent, St. Helens Hospital, Auckland.

Mr. Chairman and gentlemen,—I have been requested to speak on the prevalence and effect of venereal diseases, more particularly as regards their effect on women. In my practice hardly a day passes without seeing some unfortunate woman suffering from the effects of venereal disease, and in most instances, from a moral point of view, she is entirely innocent. It has always struck me that the medical profession has made very little effort in the direction of the prevention of venereal diseases; and what they have done has not always been backed up by the local Governments. What an outcry is raised if there is an outbreak of smallpox, scarlet fever, or plague! Yet it is stated by Neisser that with the exception of measles, gonorrhoea is the most widespread of all diseases.

Venereal diseases are amongst the most ancient known. They were described by the Japanese in B.C. 900. They can be traced back to the earliest records of the human race, their progress through the generations having left in its wake a blind, halt, maimed, sterile, and sexless multitude. It is instructing to note that in the early ages many efforts were made to limit the disease, and yet how little have we progressed since then. A few instances will suffice: Beckett tells us of an Ordinance dated in 1162, and formulated by the Bishop of Winchester, for the purpose of checking the spread of gonorrhoea. A similar Ordinance dated the 8th August, 1343, and attributed to Joanna I, Queen of both Sicilies, states in similar terms enactments against the spread of venereal diseases.

The fear of the diseases in the early ages was very great. Sanger informs us that the afflicted individuals were driven into the fields to die, the physician refusing to attend to the sick for fear of becoming infected. Nowadays, people are inclined to consider it a trivial matter, mainly through ignorance of its far-reaching effects. Towards the end of the fourteenth century its infectious nature was clearly recognized. Numerous Ordinances and Police Regulations for its control were in force, and medical supervision of houses inaugurated. Owing to the prevalence of venereal disease James IV, in 1497, issued his celebrated Proclamation banishing all the infected from Edinburgh. This was aimed chiefly against syphilis. In the reign of Henry VIII there were six lazar houses for the reception of venereal patients.

Early writers paid little attention to the effects of gonorrhoea in women. It was not until 1872 that Emil Noeggerath published a work destined to revolutionize the views of the medical world regarding the significance of gonorrhoea in the female. He states that of a hundred women who become the wives of men who have formerly been affected with gonorrhoea scarcely ten remain healthy.

A woman who at any time of her life has had gonorrhoea has to expect at some more or less distant period a subsequent attack of peritonitis in some form. A common history of these cases is as follows: The young and hitherto healthy wife begins to complain a few weeks after marriage. I need not here detail her symptoms. According to the severity of the attack, she remains confined to her bed for weeks or perhaps for months, then, exhausted in her struggle for life, she ultimately recovers, but remains sterile and perhaps a chronic invalid for the rest of her life. Gonorrhoea, both in men and women, may be non-effective or may lie dormant for indefinite periods.

Norris states that gonorrhoea is the most potent factor in the production of involuntary "race suicide," and by sterilization and abortion does more to depopulate the country than does any other one cause. As I have stated above, a woman is usually rendered sterile by an attack; but if she is not rendered sterile she usually only bears one child. When pregnancy does occur the subsequent labour is often followed by blood-poisoning.

It is stated by several authorities that from 14 per cent. to 17 per cent. of all cases of puerperal infection are due to the *Gonococcus*. From my own experience, I am quite sure that the *Gonococcus* not only produces infection during the puerperal period, but, by its presence, is a strong predisposing factor in the production of other forms of sepsis or blood-poisoning. When the resistance of the parts is lessened or overcome by the *Gonococcus*, other pathogenic bacteria seem more able to produce their characteristic effects.

Gonorrhoea is the cause of at least 50 per cent. of all pelvic inflammatory diseases in women. From 30 to 50 per cent. of all childless marriages are directly caused by gonorrhoea. At a low estimate, gonorrhoea causes 20 per cent. of all the blindness in the world. In the United States census for 1900 for the blind and deaf it was shown that 25·02 per cent. of all blindness was due to ophthalmia caused by gonorrhoea. It has been computed that in Prussia venereal diseases cause an annual loss to the State of 90,000,000 marks (nearly £5,000,000). The Royal Commission on the Blind, Deaf, and Dumb, which reported in 1889, estimated that seven thousand persons in the United Kingdom had lost their sight as a result of ophthalmia due to gonorrhoea, and that the number of people thus disabled represents an annual burden to the State of £350,000.

In 1901 a special committee, known as the "Committee of Seven," was set up in America to report on the prophylaxis of venereal diseases. This committee estimated that at that time there were 220,000 venereal patients walking the streets of New York. In thirty-six dispensaries and charitable institutions 14,649 cases of gonorrhoea and 7,607 cases of syphilis were treated during the year. In addition 9,452 were grouped as venereal, in which presumably a positive diagnosis had not been made, bringing the total to 31,708. In addition 3,907 cases were the result of gonorrhoea and syphilis.

The Committee on Prophylaxis of Venereal Diseases, appointed by the Washington State Medical Association, report that 80 per cent. of all men in large cities have had gonorrhoea, 45 per cent. infect their wives, 80 per cent. of all operations upon women for diseases of the uterus and adnexa are due to gonorrhoea, and 20 per cent. of all blindness.

Neisser states that 75 per cent. of all men, and 45 per cent. of all women, have had gonorrhoea, and that 30 per cent. of the females have been infected by their husbands. Bierhoff, in 1910, estimated that there were 1,000,000 persons in New York affected with venereal disease.

According to Emley (Kansas Med. Soc., 1908), 15 per cent. of all patients in the Paris hospitals, 10 per cent. in all the New York hospitals, and 33 per cent. in all the London hospitals have suffered from venereal disease.

Swarts ("Report of State Sanitary Officers," 1910) states that 70 per cent. of all women who come to the New York Hospital for treatment of venereal diseases are reputable married women who have been infected by their husbands; that in New York there are annually 12,500 cases of measles, 11,000 cases of diphtheria, and about 19,000 of tuberculosis—in round numbers, 41,000 cases of infectious disease. During the same period there are 243,000 cases of venereal disease.

In 1902 the Prussian Government estimated that at least 500,000 persons were infected with a venereal disease yearly. Another and later authority (Kean, 1912) places this figure at 773,000.

The report of the Committee of Seven shows that in cases in which the source of infection could be traced 8,053 were from public prostitutes, whereas 3,915 were from clandestine alliances. The report also states that there were 988 cases of marital infection, seemingly indicating that nearly 33 per cent. of all venereal diseases found in private practice among women were communicated by the husband.

In certain quarters it is believed that venereal disease comes as a form of punishment for sin. Every year thousands of innocents, usually wives, are infected. Statistics regarding venereal disease are notoriously inaccurate. Nevertheless, such carefully computed reports as those just quoted cannot fail to impress an unbiased mind with the fact that the public prostitutes in the City of New York to-day are by far the most prolific disseminators of venereal disease.

Menge, in 1910, states that in Germany, where public prostitutes are under supervision, gonorrhoeal infection from this source is rather uncommon, but that the clandestine prostitute is a prolific disseminator of the disease. Most authorities assert that nearly all cases of gonorrhoea can be ultimately traced to prostitution.

Prophylaxis of Venereal Disease.

The prevalence and ravages of venereal disease are at the present time so great as to urgently require the grave consideration of every physician and student of sociology. There is no disease to which the axiom "Prevention is better than cure" applies more forcibly than to venereal disease. Every venereal is a source of danger to the community, much more so than is the person who is suffering from an ordinary infectious disease. The latter is usually confined to his house by law, while the latter mix with their fellow-citizens, and so establish a chain of infection.

The subject of the prevention of venereal disease is one that is approached by most English-speaking people with a degree of repulsion. Apart from the moral aspect, there seems to be a general idea that such subjects are better not discussed. As a consequence, we have the sorry spectacle of our Boards of Health ignoring a large and important group of contagious diseases that are a menace to the public and private health, and well known as one of the most potent factors in the production of "race suicide." This is probably explained by the fact of the difficult moral problems involved. The double standard of morals is undoubtedly a strong factor in the production of venereal disease, and there seems little likelihood of a change in this respect.

Education seems to me to offer the best and most hopeful means of securing eventual success in the prevention of venereal disease. Owing to the secret nature of venereal disease, this can best be accomplished through the agency and help of the medical profession. The prevalence and ravages of venereal disease are not known to the majority of laymen, in whose minds this group of diseases is too often regarded as comparatively mild. If their extent and harmful influence were more generally recognized a great step in advance would be made in dealing with these conditions, and the medical adviser sought for instruction and help. Sex education will not enforce universal morality, but it will help in many decisive battles with sex instinct. To those who see nothing in this movement because it will not solve all sex problems I would point out that general education makes more efficient and better citizens in most instances, but it also often fails.

I consider that all secondary-school children should receive instruction in sex hygiene—boys at the age of fourteen or fifteen, girls a year or two older. It is surely better for them to obtain such information from a reliable source than to depend on the present method of obtaining a scattered and distorted view from older children, or even from more harmful sources. Male teachers should instruct the boys, and female teachers the girls.

In 1912 138 schools and colleges in the United States of America arranged for the systematic teaching of personal and sex hygiene. In Australia leaflets are distributed at the university, and in the higher schools pupils between sixteen and eighteen are instructed by the school physician.

Much could be done by lectures delivered to various business and working-men's associations, unions, large industrial institutions, Territorials, young men's and women's friendly societies, &c. I think great care should be taken to have such lectures free from moral and religious teaching.

The intermingling of the sexes as the result of the modern trend of business life is detrimental to the morality of women. Other important factors tending towards sexual impurity, and therefore towards the propagation of venereal disease, are certain economic problems—the influence of overcrowding, labour competition, faulty home environments, migration to cities, child-labour, ignorance, and inadequate moral training. In addition, the advertising of unlicensed practitioners of medicine, patent medicines, massage establishments, and the abortionists—all have an undermining influence on public morals, and so have to be taken into consideration in attempting to reduce the prevalence of venereal disease.

The history of medicine shows that all great steps in the prophylaxis against disease have been accomplished along educational lines—*e.g.*, the preventive measures against tuberculosis. Indulgence in alcohol is undoubtedly a great factor in lapses from the paths of virtue. Moller, in an investigation of 661 patients, found that 67 per cent. were intoxicated at the time the disease was contracted. This in itself is a great plea for temperance. Early marriage is also a factor in the prevention of venereal disease. Finally, I would suggest that—

(1.) The Government should pay lecturers to address special meetings of parents, teachers, &c.

(2.) The Education Department should arrange for the study of biology, and provide instruction in sexual hygiene for the upper grades.

(3.) Instruction in sexual hygiene should be provided at the university colleges by means of pamphlets or otherwise.

(4.) Church clubs and mothers' unions might be utilized for the instruction of parents.

(5.) The Government to take action along the following lines: (*a*) Segregation of prostitutes; (*b*) compulsory but confidential notification of venereal disease; (*c*) examination of men before marriage; (*d*) making it a penal offence to spread venereal disease; (*e*) the establishment of free dispensaries for the treatment of venereal disease. This last is most important, as by modern methods we are able to curtail and cure venereal diseases, and if the treatment is applied in the early stages we can prevent many of the ill effects and sequelae.

SECTION OF DISEASES OF CHILDREN.

PRESIDENT'S ADDRESS.

By Dr. W. F. Litchfield (Sydney).

I would like to express my appreciation of the honour of being called upon to preside over this section. At the same time, I must say it would have given as much or greater pleasure to have served the section under the presidency of Dr. Swift, of Adelaide, or Dr. Clubbe, of Sydney, both of whom were elected prior to me, but had to retire for private reasons.

This is the third Australasian Medical Congress to have a section for the diseases of children, and I trust that the practice will continue in the future; for what can be of more importance than the discussion of ways and means, medical and social, of saving young lives and giving them a good start in the battle before them.

I propose to discuss briefly the question of babies' homes and foundling hospitals, a subject which has interested me for a number of years, and one on which it is very important both for medical men and the public to have right views.

My remarks apply to institutions that admit children under one year without their mothers. In 1899 I contributed an article to the *Australasian Medical Gazette* on infants' asylums, in which I pointed out that the results in such places all over the world were uniformly bad. Let me requote some of the evidence. At the Infants' Asylum, Randal's Island, New York, the mortality was 90 per cent. At the Naples Foundling Hospital in 1895, out of 856 infants admitted, 853 died within the year. In Paris, hospitals for infants were authoritatively designated as veritable death-traps. At the Charité Hospital, Berlin, the infant mortality was between 80 and 90 per cent., and, even after thorough reorganization, 65 per cent. At the New York Foundling Hospital, managed by the Sisters of Mercy of that city, the results had been so bad that only nursing-mothers with their babies were admitted, and boarding-out of artificially fed infants was adopted.

Two institutions in Sydney—the Ashfield Infants' Home and the Home of Hope at Newtown—owing to bad results, had some time before refused admission to infants without their mothers. The following evidence given before the Royal Commission appointed by the House of Lords to consider the Infants Life Protection Bill of 1896 was also quoted: Mr. Rudolf, secretary of the Church of England Waifs and Strays Society, said, "We found the rate of mortality very high when a number of infants were nursed together in one institution, so that now we board out the children separately." Dr. Barnado, of the Barnado Homes, said, "The mortality and sickness of children boarded out is very much smaller than in the case of children brought up in any other way whatever. I would not consider it right to place out more than one infant under twelve months old in any house." The Rev. Dr. Waugh, Director of the National Society for the Prevention of Cruelty to Children, said, "I think it an exceedingly bad thing on many grounds to put a large number of infants of a similar age into one place. They are sure to kill one another; by the mere atmosphere they inhale they are killed."

Since writing that article I have kept in touch with the subject, and have no reason to alter my views.

There has recent been published in Germany a book by Dr. Ludwig Myer called "Hospitalization of Infants." The mortality statistics quoted are very similar to those indicated above. It is also pointed out that even a short detention in an institution is dangerous to the subsequent chances of an infant. It is further pointed out that complete cleanliness and asepsis in the management of the food does not prevent a high mortality. The high mortality is attributed to a state of weakness induced by a want of individual attention, and all that is implied by the word "mothering," aided by epidemic affections of the lungs and bowels.

In the report of the State Children's Council of Adelaide for 1911 the following passage occurs: "A remarkable illustration of the dangers of institutional life for infants is given in a report on infant mortality written by Dr. Helen Macmurchy, of Toronto, where it is stated that one society reduced the mortality by placing out children in homes in the following ratio: The children were in an institution from 1896 to 1898, and the death-rates were—1896, 98 per cent.; 1897, 99 per cent.; 1898, 100 per cent. Placing them out then began, and in 1899 the mortality dropped to 56 per cent., in 1900 to 31 per cent., in 1901 to 19 per cent., 1902 to 11 per cent., and in 1904 to 10 per cent."

The State Children Departments in most of the Australian States have adopted the policy of boarding out infants, and have set their faces against institutions for babies. Various philanthropic bodies, however, still persist in housing babies in asylums. How they have fared in New South Wales in recent years may be seen in the following figures taken from the Government Statistician's report on the vital statistics of Sydney and suburbs for 1911:—

Mortality of Children in Infants' Homes.

(Death-rate per cent. per annum—Children under one year of age, 1902 to 1910.)

Infants' Home, Ashfield	32·39
*Nurse Frost's Home	82·98
Waitara Home	73·78
*Harmony Home, Thirlmere	57·35
Benevolent Asylum—	
Born in institution	47·65
Admitted to institution	59·75

To properly estimate the effect of institutional treatment on infants it is necessary to state the figures correctly. To merely state the case mortality gives information of no comparative value. Mr. J. G. Trivett, Government Statistician for New South Wales, has kindly written me a few lines showing the proper method to pursue. It would be a good thing if his methods were universally adopted. He writes, "I am pleased to comply with your request this morning as to the mode of computing the death-rate per cent. per annum in infant asylums. The number exposed to risk for *one complete year* is derived from the total duration of the survivors. To this number add the total who died, who are considered, according to actuarial usage, to have died at the end of the year. This gives the total exposures. Then, relating the number of deaths to the number which expresses the exposures, we find the death-rate per cent. per annum."

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* These institutions commenced operations in 1907

In order to make my statement of this matter a comprehensive and authoritative one, I invited various authorities in the different States to give their opinions on the subject. In reply, Sir Charles McKellar, President of the New South Wales State Children Relief Board, says, "In answering your question regarding so-called babies homes and foundling hospitals (under which terms I include all those institutions which receive young infants apart from their mothers), I regret to say that my experience has always been unfavourable, even under the most careful management; and where there has been the slightest laxity—and to a greater or less extent laxity of management has been the rule—they have been disastrous to the infants. In my opinion, the whisky-bottle does not do a tithe of the harm to the adult that the feeding-bottle does to the baby. And, leaving the medical aspect of the question entirely out of consideration, the existence of such institutions is a cruel wrong to the infants, and a curse to the community in which they are placed."

Dr. A. Jeffreys Wood, Collins Street, Melbourne, states, "After twenty years' experience as Honorary Medical Officer at the Foundling Hospital, Berry Street, East Melbourne, I felt compelled to resign my position, as I had formed the opinion that the system was a wrong one, and that it led to the sacrifice of many lives that would have been saved outside the four walls of an institution. I have seen one epidemic of whooping-cough and broncho-pneumonia kill twenty-three children under two years of age out of a total of thirty-four infants. I have seen the introduction of a single case of gastro-enteritis amongst a number of healthy babies lead to an epidemic of the same disease which proved fatal to many of them. Aggregation of infants is a fatal mistake, and every step should be taken by those interested in the saving of infant life to fight hard against the principle. Board out the babies into families with good foster-mothers and good supervision; and country homes, rather than city homes, is, I am certain, the proper solution of this question. Adelaide has pursued this plan with great success in the past. Three years ago I calculated the deaths of infants at the foundling hospital I was connected with, and found that from start to finish the death-rate amongst those babies that had been admitted to the institution from its foundation was no less than 30 per cent. I venture to say that nearly every institution of a similar sort will show similar figures."

Dr. A. Jefferis Turner, Wickham Terrace, Brisbane, writes, "Babies' homes and foundling hospitals are necessary evils. As institutions for rearing infants, their imperfections may be minimized but cannot be removed. Mother and infant should never be separated where separation is avoidable. To keep them together wherever possible should be the first aim of all those who are grappling with the consequences of illegitimacy, and every mother where possible should suckle her own infant."

Dr. C. P. B. Clubbe, Macquarie Street, Sydney, writes, "I have not personal experience of foundling hospitals or babies' homes; indeed, I have always refused any official connection with such institutions, because for many years I have known the great danger of aggregating infants: First, because of the danger of infection one to the other; second, because from the nature of things it is impossible for them to receive the individual attention that is every baby's birthright. Even at the Prince Alfred Hospital years ago the children's ward was recognized by many of us as a danger-spot for babies, and for this reason: infants admitted for intussusception were put with the adults. And at our Children's Hospital, as you well know, in spite of every care from time to time babies while in the hospital have contracted diseases (other than that for which they were admitted) which have ended fatally. Many medical men now recognize the danger that young infants run from treatment in institutions, and I think the time has arrived when it should be more widely known, and pressure brought to bear upon the proper authorities in each State, in order that steps may be taken to minimize the danger, and so very materially lessen the infant mortality."

Dr. J. Macdonald Gill, Macquarie Street, Sydney, writes, "You have asked me for an expression of opinion as to the wisdom of treating gastro-enteritis in hospitals, or of putting babies into crèches, asylums, or hospitals. I am of opinion that babies are best treated at their own homes if that be possible; or be boarded out with reliable women if the mother is ill, or has to work, or is for any reason unable to look after her baby. Individual care and attention are absolutely necessary. The child should be occupied and amused all day, and should be nursed when he or she needs it. Moreover, each child's individual peculiarities should be considered and respected."

Dr. R. B. Wade, Macquarie Street, Sydney, writes, "I am quite in agreement with your views as to the need of segregation of all babies under one year, whether healthy or ill. I for a time attended a babies' home, and am satisfied that the massing-together of infants under one year of age is to cause a large and unnecessary rise in their mortality-rate, owing to infectious diseases, when once introduced, spreading among them like a flash. My practice at the Children's Hospital is to have all babies who are admitted for surgical treatment taken back home at the end of a few days; and by so doing these cases no longer develop the diarrhoeal infections that used every now and then occur, and carry off a baby recovering from the actual operation. It is a source of much pleasure to me to know that you are making the institutional treatment of babies under one year a subject for criticism in your presidential address, as there is, to my mind, no doubt that it has been tried in the fire of experience, and been found wanting, and I feel that work in the future in these matters must be carried out on lines that will give more scope to the boarding-out system for the healthy, and will elaborate out-patient treatment for the sick babies."

The Secretary of the State Children's Council, Adelaide, says, "The opinion of the State Children's Council on the subject of all institutions for infants is best set forth by its settled policy of placing children (and especially babies) in homes where there is, if possible, only one infant. The statistics of the Department show conclusively that although a hospital is sometimes best for a sick child, a delicate child is more likely to live in a home where one woman loves the child than in an institution, no matter how well managed."

Lastly, the Secretary of the Neglected Children's Department, Melbourne, in his annual report for 1912 says, among other things, "The system of boarding out infants to a competent nurse, with the attendance of a medical officer always available, and a trained nurse to supervise and direct, has been the means of saving many lives. The individual care bestowed on these children by the registered nurses is far before the regulation attention bestowed on them in any institution."

Such is my case against the institutional treatment of infants, and surely it is strong enough to convince philanthropically disposed persons that by such methods they will not save but waste infant life. The reasons are twofold—hospitalism and infection. In these places the crib takes the place of the mother's arms, and the child lies unheeded and unheeding, robbed of its bounding joy in life and its need for soothing maternal caresses. It rapidly falls into a state of malnutrition, and becomes a ready prey to the onslaught of gastro-enteritis or other infectious diseases that sooner or later attack the too susceptible fold.

In conclusion, it may be pointed out that there is no real need for infants' asylums or babies' hospitals. With a properly organized system, deserted, motherless, or neglected infants could be immediately cared for in private homes. If a mother be homeless, a home can be found for her and her child; if an infant be deserted, motherless, or neglected, a suitable foster-mother can be obtained; if a baby be sick, it can be nursed at home, or a suitable home and foster-mother temporarily provided for it.

THE PREVENTION AND TREATMENT OF SUMMER DIARRHOEA.

By W. F. Litchfield, M.B.,

Hon. Assist. Phys., R.A.H.C., Sydney; Hon. Assist. Path., R.P.A.H., Sydney.

Before dealing with the prevention of summer diarrhoea it will be necessary to say a few words on the nature of that disease. It goes by other names—gastro-enteritis, infective diarrhoea, intestinal intoxication, cholera infantum. It is mainly a disease of the first two years of life, but attacks all ages, and accounts for a not inconsiderable number of deaths towards old age. It is most fatal during the first year, and in Australia probably directly or indirectly accounts for 50 per cent. of the deaths under one year. It is epidemic in the hot months of the year, but occurs sporadically or in small epidemics right through the year. It is a disease of the subtropical regions. It is less severe in cold climes, and shows an inverse relation to rainfall.

The trend of modern opinion is to regard summer diarrhoea as an acute infectious disease with a short incubation period. To this proposition I must give, after a wide and continuous experience over a period of fifteen years, my unreserved support. The causal organism or organisms, for it is probable there is more than one of an allied group, have not been definitely ascertained. Anatomically the disease is an ileo-colitis; there is congestion of the mucous membrane with swelling of the solitary and agminated glands, which may go on to ulceration; the stomach and upper portion of the small intestine is not affected.

The problem of the prevention of summer diarrhoea is, then, that of protecting the infant against infection by the causal organisms of that disease. Now, although our knowledge is by no means complete on the causes of infection in summer diarrhoea, we know sufficient to draw some practical conclusions.

We have, first of all, the comparative immunity of breast-fed infants to the disease. This is so striking that we can say, if all infants were breast-fed during the greater part of the first year of their lives, summer diarrhoea as a serious problem would cease to exist. I am aware that the immunity conferred by breast-feeding is not absolute, and that the disease is rife after weaning in the second year; but its ravages in such cases are comparatively light. Even where the surroundings are bad—for example, in slum areas where there is domestic overcrowding and defective domestic and perhaps municipal sanitation—breast-feeding offers an effective barrier to the disease. One indication, therefore, is the encouragement of breast-feeding, a performance which carries with it other benefits both for the child and mother. Most mothers can, if they wish, suckle their children. There are two classes, however, with whom it is difficult—unmarried mothers and married women who have to work in factories for their living. It should be a matter of public policy to provide means of their being able to do so. Fortunately, the latter class is not much in evidence in Australia and New Zealand, but in the older countries it is fairly large, and I think its claims are coming to be recognized. For many reasons illegitimate children are weaned early. The death-rate amongst them is three times that of all infants. In New South Wales, owing to the efforts of Sir Charles McKellar, the State Children Relief Department has provided cottage homes, where unmarried mothers and their babies may live free of charge for six months after the birth of the infant. This is a step in the right direction, although many refuse to profit by it.

Next, it has been established that domestic overcrowding encourages the prevalence of infective diarrhoea. Domestic overcrowding means the common sharing of rooms or houses by too many people. Newsholm makes out that the number of people or houses to the acre does not matter so much. Even in tenement houses the number is not important so long as there is isolation of families and no overcrowding in rooms, as exemplified in the Peabody buildings, where the infant mortality has not been excessive. The worst form of overcrowding is where a number of artificially fed infants are housed together. The universal experience is that babies' homes and foundling hospitals always result in a huge mortality. The question of overcrowding is a social and economic problem, difficult but not incapable of solution if the public conscience be aroused. With regard to babies' homes and foundling hospitals, it is time that philanthropically disposed persons should learn that they do not save but waste infant life.

Next, the importance of domestic and public cleanliness in preventing diarrhoea is well known. The necessity for good drainage, the proper disposal of excreta and garbage, is recognized by all public authorities; but in the case of summer diarrhoea these are of no avail unless accompanied by cleanliness in the house. Adults use sanitary conveniences, children tend to foul the home; and it is possible to have a home reeking with disease even though the sanitary arrangements and connections be ideal. People should be taught to understand that diarrhoea is an infectious disease, and that the discharges and soiled napkins should be disinfected and disposed of as carefully as is done in cases of typhoid fever. Further, infants with diarrhoea should not be carelessly taken to other homes where there are children, any more so than if they were suffering from diphtheria.

Cleanliness must be observed in preparing the infant's food. I agree with Newsholm, Peters, and others that infection takes place in the home, as a rule, and that only rarely can the source of the milk-supply be blamed. It is customary for authorities to assume that food is the main vehicle of infection in diarrhoea. That it may be in many instances I do not wish to deny ; but that infection takes place in many other ways I am convinced—for example, by direct personal contact, through soiled clothes, polluted floors, and even infected dust. It is important to remember that sterilization of infants' foods has not done much to lessen the incidence of diarrhoea. The part that flies play in disseminating the disease is as yet uncertain. It is quite possible that the fly is a carrier of the infection, and for that reason the child's person and food should be protected from its visits, and the breeding-places of the fly destroyed if possible. Lastly, it must be remembered, as pointed out by Ballard, Niven, Peters, and others, that badly nourished infants succumb more readily to diarrhoea than robust ones, and that every care should be taken by good feeding, good surroundings, and careful mothering to keep the child in a good state of health, and, as one attack of diarrhoea is itself perhaps the most frequent cause of malnutrition in infants, special care must be taken in the convalescence from that disease lest there be a relapse or a reinfection.

Before setting forth the treatment it will be necessary to say a few words on the symptoms and course of the disease. We may describe a typical case as follows : A child in good health suddenly develops fever, colicky pains in the belly, and starts vomiting, to be followed after an interval by loose motions. At first there is drowsiness and great thirst. Soon the child becomes collapsed, and thereafter passes into a state of exhaustion, characterized by rapid wasting, a distaste for fluids, an utter weariness, weak muscles, an inelastic skin, and a distressing wakefulness. Slowly the appetite and strength returns, the diarrhoea lessens, and the weight increases. The vomiting ceases, as a rule, after the first few hours. The stools are at first copious and foul ; subsequently they become green, and resemble chopped spinach, less foul and copious ; and later blood and mucus appear. As the child improves, the stools become pultaceous and foul. The loose motions continue for three or four weeks, and even then the child will not have regained its former robustness. Such is an average case that recovers. At times the disease is ushered in by severe convulsions. At times the disease is dysenteric in character, the motions being more frequent, accompanied by much straining, and consisting of blood and mucus with little faecal matter. More rarely the motions are choleraic, being very profuse and watery, and accompanied by profound collapse. Death may occur during the initial convulsions, from shock early in the illness or from exhaustion subsequently. Relapses or reinfections are not common. Purpura and oedema may occur at any time after the first few days. The disease may become chronic and the child pass into the state known as athrepsia, atrophy, or chronic diarrhoea. I recognize two main stages of the disease—the inflammatory stage and the stage of exhaustion. The two overlap to some extent, but the essential feature of the latter is a depression of the whole vital force, resulting in a stagnant circulation, an utter weariness, and marked muscular weakness. The depression of the organs of digestion and assimilation is of the most serious import, because while it lasts the wasting continues, and the child is threatened with starvation not because it has no food, but because it cannot use it. It is here the tragedy often culminates. If food be taken it may not be metabolized, and the system charged with deleterious products such as volatile acids. Further, this stimulation of exhausted tissues prevents their recuperation, and is probably partly the explanation of the nutritional failure and atrophy that often occurs. It is probably a wise provision of nature that makes the child reluctant to take food during this time. The problem is a difficult one, for without food the child will starve, and with food its disabilities may increase. However, I shall return to this phase of the matter later.

I come now to the treatment. First let it be remembered that the cases vary much in severity, so that one may die in the initial convulsions or within a few hours, while another may show no more than some intestinal colic and a few green motions. As a matter of fact, the case mortality is low, the majority being of the less severe type. No case, however, should be neglected, as it is not uncommon for a mild case to light up and become severe. Generally speaking, one sees the worst cases early in the seasonal epidemic. At the very onset general treatment may be required; the administration of chloroform, or, better, A.C.E. mixture, may be necessary to arrest convulsions; tepid sponging or cold packs to reduce the fever, or a cautious dose of morphia to relieve pain or restlessness. Collapse is the first special symptom to watch for, and must be vigorously treated. The symptoms are pallor, restlessness, sunken eyes, cold extremities, and a rapid weak pulse; the temperature in the rectum may be high. The immediate remedies to be applied are mustard baths or packs, and diffusible stimulants in the shape of alcohol. If a satisfactory reaction does not occur, subcutaneous or intravenous isotonic salt-solution may be given. Of intravenous injections of salt-solution in such cases I have not had much experience, but from time to time have used salt-solution subcutaneously, and it certainly helps in some cases; but I cannot support the extravagant claims of some that it is a never-failing remedy. The injection of sea-water in my hands has also failed to come up to its reputation. According to Embley and others, a distinction has to be drawn between collapse and shock. Collapse is due to loss of fluids from the blood-vessels, while shock is a vital depression due to sudden foreign disturbance. There is certainly a loss of fluids in this disease, but in the widespread sudden inflammation of the bowel there is also the element for the production of shock; and while salt-solution is always valuable in collapse, it is of no value in shock, which may explain why it often fails to bring about the desired reaction. Of the value of alcohol there can be no doubt, and right through the acute stage of the disease should be given freely, well diluted. Vomiting and purging will have most likely cleared out the intestinal tract, but a brisk purgative, such as a dose of castor-oil, should be given early. There is no specific remedy for the disease, and in my opinion the old plan of a continuous and gentle purgation is the best procedure, and for this purpose nothing is better than one of the mercurials. Grey powder, gr. $\frac{1}{6}$ to $\frac{1}{4}$ every four hours; calomel, gr. $\frac{1}{12}$ to $\frac{1}{6}$ every four hours; hydrarg. perchlor., gr. $\frac{1}{80}$ every hour or gr. $\frac{1}{40}$ every two hours are all suitable. Some prefer castor-oil as an eliminative. It may be given in ten- to twenty-drop doses every four hours. Epsom salts is another alternative, and may be given in 10 gr. doses every four hours. Castor-oil and perchloride of mercury may be given together, as in the following prescription: Ol. ricini, μ vi; lig. hydrarg. perchlor., μ iii; mucilaginis, q.s.; aq. carui, oz. 2: two drachms every four hours. Opium and bismuth are often added to the mercurials. With regard to opium, the greatest caution is necessary: small doses often throw infants into a prolonged stupor, and induce an undesirable sluggishness of the bowels. Moreover, in the stage of exhaustion the susceptibility to opium is increased; and it should also be remembered that the child is already taking a narcotic in the shape of liberal doses of alcohol. Therefore opium should not be given as a routine. In cases, however, where there is much pain, restlessness, and straining, small doses of Dover's powder, gr. $\frac{1}{12}$ to $\frac{1}{6}$, or tr. opii $\frac{1}{6}$ to $\frac{1}{2}$ μ, every fourth hour may be given as a temporary measure. The value of bismuth is not easy to estimate. My experience is that when bismuth turns the motions black the prognosis is favourable, but that does not necessarily mean that the bismuth has induced the change. I have used large doses of bismuth, but have not found them more effective than small ones. Bismuth may be prescribed with grey powder or calomel or with Epsom salts. The following is an elegant preparation: Bismuthi salicylatis, gr. 5; pulv. acaciae, gr. 5; cinnamon water, oz. 2: two drachms every four hours. And, in conjunction with 20 μ of castor-oil three times a day, may be used as a routine treatment. Of the value of intestinal antiseptics I am doubtful, and I have no faith in astringents. Hot cloths applied to the belly are useful for colic, and hot baths or packs may be used to induce sleep if there be much restlessness. When the motions are very frequent, washing out the bowel with warm saline solution relieves some of the distress. Small starch enemata may be used when the motions are dysenteric in character.

The next consideration is the diet. For some hours after the onset nothing should be given by the mouth but water. At the beginning thirst is often excessive, and may be satisfied with frequent small drinks of cold water. Subsequently whey may be given for a few days. I judge whey to be one of the best things to give in the early stages, for besides containing some nourishment in a light form it supplies salts to replace those drained off in the evacuations. White-wine whey is an excellent preparation in the acute stages of the disease. Mellin's food subsequently may be added to the whey, and thereafter small quantities of milk, to be gradually increased as the acute symptoms wear off.

Children on the breast should not be taken off except for a few hours, or till the vomiting ceases. It is rare for babies on the breast to die of enteritis. Breast-milk probably contains some immunizing bodies, and also in the quality of its salts helps to prevent the child from falling into that state of dystrophy which is such an important feature of the complaint. Albumen water, to which barley water, sugar, brandy, lime water, and cinnamon water may be added in suitable proportions, is another good food for the early stages of the disease. Methods such as these carry the case along for a few days, but then the question of feeding often becomes more difficult instead of simpler. As the child passes into the stage of exhaustion it shows a distaste for food, and will often heave at the sight of it. Moreover, if food be forced on it, vomiting occurs. It is here that the great art in the management of the case begins. The child, besides refusing food, suffers from a distressing wakefulness. It lies weak, wasted, and wrinkled—a picture of utter weariness, and yet unable to rest. The basis of the trouble, as already stated, is an exhaustion of the system, and the keynote is the exhaustion of the power of assimilation. In other words, the disease has become chiefly a nutritional one. Clearly, rest is needed, and to that end individual and intelligent nursing is necessary. This attention I maintain cannot be given in a hospital; and for that reason, and for the reason that reinfections from other cases may occur in convalescence, these cases should not be treated in hospitals.

The first thing necessary is to get the child to sleep. This is best done by nursing in the open air and in a cool place. Healthy children stand hot weather remarkably well, but infants suffering from enteritis always get worse on hot days, and I have frequently seen cases doing well collapse and die during a heat-wave. Rested in this way the child will take a little food from time to time. In no case should food be forced on the infant, and patience will ultimately be rewarded by the child taking food more readily, and progressing slowly towards convalescence. Many of the cases, however, become chronic; the diarrhoea persists, and the wasting continues. These cases are variously styled athrepsia, chronic diarrhoea, atrophy, and marasmus. In some cases even when the diarrhoea is no longer severe, and food taken fairly well, the wasting goes on. No cases are more difficult to treat. The failure of nutrition is due to a failure of assimilation of food. German authorities—Finkelstein, Czerny, and others—aver that assimilation fails first with fats and then with carbo-hydrates, and finally with proteids. Fats should be cut out of the food. If it appears that carbo-hydrates are at fault, these should be omitted, and raw-meat juice or casein mixtures tried. Sometimes a mixture of carbo-hydrates, the so-called poly-carbo-hydrate mixture, agrees better than a single carbo-hydrate. Keller's malt-soup is largely used on the Continent, and I have found it useful in some cases. Food should be given at infrequent intervals, either four- or six-hourly. Salts, no doubt, play an important role in maintaining nutrition, but we are ignorant of how to supply them in the proper form except by mother's milk. Fruit-juice may do good, and is usually relished. Butter-milk is advocated by some, and may be tried. Some of the older children evince a desire for dry food, and in such cases a little stale bread, toast, or biscuit may be tried. I recently successfully treated an extreme case of atrophy in a child two years of age on Keller's malt-soup, raw-meat juice, and 2 gr. of lecithin three times a day.

Cheadle's bread-jelly, prepared and used as he advocates, will suit some cases. Condensed milk is sometimes useful, and Benger's food, or one of the proprietary malted foods, may sometimes be tried with advantage. Thus it will appear in these cases there is no royal road. Unremitting attention, the general measure advocated above, and feeding on the lines indicated, with common-sense modifications, will give the best results, and, though by no means always successful, will secure many triumphs.

DISCUSSION.

Dr. A. Jeffreys Wood (Melbourne) believed that summer diarrhoea was frequently due to milk-infection. These cases usually did badly as in-patients in hospitals, but often recovered if treated as out-patients, provided that pure milk and ice was provided. He instanced the lowering of the mortality in Melbourne from summer diarrhoea, owing to the good work done by the Lady Talbot Milk Institute. That society provided the poor at a low cost with certified milk from cows which had been proved free from tuberculosis. The bacterial count of this milk was a very low one, in some cases not more than 2,000 per cubic centimetre. Ice was supplied in hot weather, and district nurses visited the babies in their homes, and gave simple directions for bottle-feeding.

Dr. Te Rangihiroa, M.P. (New Zealand), spoke on the Maori baby, and its liability to summer diarrhoea and other infections. He regretted that bottle-feeding was becoming common among the Maoris.

Drs. Storie Dixson (Sydney), Hallen (New Zealand), Morris (Adelaide), Ferguson (Sydney), and the Secretary also spoke; and the President replied.

A CLINICAL AND BACTERIOLOGICAL INVESTIGATION OF INFANTILE DIARRHOEA.

By R. L. Forsyth, M.D.,

Clinical Assistant to Out-patients, Children's Hospital, Melbourne.

It is now three years since this investigation began, and in presenting my report I must again acknowledge the generosity of the trustees of the late Edward Wilson, who financed it.

Our medical education and our hospitals compare well with those of other countries, but little encouragement is given to original clinical work; any effort on the part of the public to promote such work is therefore to be gratefully acknowledged.

The staff of the Children's Hospital, and especially Dr. Stawell, I cannot thank enough; every possible help was given me, and in the last year the cases were handed over to my control entirely. Residents, nurses, and office staff all gave their efforts and interest to the work.

The Veterinary School undertook the animal experimentation, and carried it out perfectly in spite of great difficulties.

In stating the result of the investigation it must be remembered that the point to be settled was the presence and significance of one class of germ. I claim to have settled this point, more than this has not been attempted.

We may divide the swarm of bacteria in the stools into anaerobic and aerobic. I do not know of any satisfactory results in anaerobic work. An investigation started at the Lister Institute in 1912 ended without result. The aerobes, of which we have a working knowledge, grow on ordinary agar media ; possibly there may be many of importance that require other media.

We then divide those growing on agar into those that grow in the presence of bile salt and those that do not.

Although it is reasonable to suppose that in a tract periodically flooded with bile the former class will be the better able to develop, we cannot ignore the latter class, to which the common cocci belong. Nevertheless, this investigation confines itself to the first class.

It is interesting, however, to note that, although cocci are found plentifully in the large bowel of the normal baby, multiplying there after most of the bile has been reabsorbed, in the green (bile-laden) diarrhoeal stool they are seldom prominent, whilst in the white putrid stools occasionally met with in chronic diarrhoeas they swarm in great numbers. Again we divide those bacilli growing in the presence of bile salt into those that ferment lactose and those that do not. Among those that ferment lactose even the casual worker can distinguish various types ; they cannot all be classed as ordinary *B. coli communis*.

Nevertheless, all this work has been done on the one class, which grows in bile-salt media, and does not ferment lactose. This class includes the bacilli of typhoid, dysentery, paratyphoid, food-poisoning (Gaertner), and all the many types resembling them in cultural characteristics. The investigation has extended over three seasons (1910–13). More than three hundred cases have been examined clinically and bacteriologically, and any statement made is the result of careful work, repeated until personal error is unlikely. We may therefore put the following down as facts :—

(1.) Bacilli of this class do not occur in the stools of healthy babies to any significant extent ; nor are they met with in infants suffering from diseases unaccompanied by diarrhoea, and only occasionally and in small numbers in cases of secondary diarrhoea.

(2.) In those cases diagnosed as entero-colitis they appear in 81 per cent.

(3.) The patient's blood agglutinates the germ isolated in nearly every severe case.

(4.) The bacteriological finding has obviously some prognostic value.

(5.) Ward-infection and cross-infection has been met with in spite of skilled nursing.

From these facts it is reasonable to presume that these bacilli are the cause of, and not the effect of, diarrhoea.

On examination they may be divided into five main types. The members of any one class may differ widely, and the classification is extremely broad, but sufficient, clinically, for our present knowledge :—

(1.) Shiga or Flexner-like bacilli, occurring in 25 per cent.

(2.) Gaertner-like bacilli, occurring in 24 per cent.

(3.) Slow fermenters of lactose, occurring in 26 per cent. (Taking three to ten days to ferment.)

(4.) Morgan-like bacilli, occurring in 7 per cent.

(5.) Liquefiers of gelatine (various), occurring in 7½ per cent.

The more skilled the bacteriology the more frequently is the Shiga-Flexner class met with, and in the last two years these have been found in 33 per cent.

Table I shows the laboratory reactions of these types.

TABLE I.—Laboratory Reactions of the Chief Types of Bacilli isolated.

Class.	Mobility.	Gelatine.	Indol Production.	Litmus Milk.			Lactose.	Glucose.	Maltose.	Mannite.	Dulcite.	Dextrin.	Raffinose.	Arabinose.	Galactose.	Sorbite.	Percentage.	Resembling the Known Type.
				1st Day.	3rd Day.	14th Day.												
I ..	—	—	+	*a*	*b*	*b*	—	*a*	*a*	*a*	—	*a*	*a*	*a*	*a*	—	25	Flexner B.
	—	—	—	*a*	*b*	*b*	—	*a*	—	*a*	—	*a*	*a*	—	*a*	—		Shiga B.
II ..	+	—	+	*a*	*b*	B+	—	+	+	+	+	+	—	+	+	+	24	Gaertner B.
III (i)	—	—	+	*a*	*a*	*a*	*a*	+	+	+	+	+	+	+	+	+	26	Various reactions, the third on the list seems the most virulent. Lactose fermented in three to ten days.
(ii)	+	—	+	*a*	*b*	B	*a*	+	+	+	+	+	—	+	+	+		
(iii)	—	—	—	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*		
(iv)	—	—	+	*a*	*b*	*a*	+	+	+	+	+	+	—	+	+	+		
(v)	+	—	—	*a*	*a*	*a*	+	+	+	+	+	+	—	+	+	+		
IV ..	+	—	+	*a*	*b*	B	—	+ bubble	—	—	—	—	—	—	+ bubble	—	7	Morgan B.
V (i)	+	+	—	Yellow			—	+ bubble	—	—	—	—	—	—	+ bubble	—	7½	Various reactions.
(ii)	—	+	+	*a*	*a*	*a*	—	+ bubble	+*b*	—	—	—	—	—	+*b*	—		

B. pyocyaneus also occurred in 3–4 per cent.

a = acid without gas. + = acid with gas. +*b* = acid with very little gas.. *b* = alkaline.
B = strongly alkaline. B+ = blue-black alkaline.

Clinically, of course, Classes I, II, and III, are most important.

Class I.—The cases which appeared most acutely ill were the Shiga-Flexner infections. Even strong babies collapsed quickly, and many died in a few days. Practically all the cases showed well-marked fever in the early stages. The stools were often blood-stained, and, in the later stages, contained much mucopus.

Diarrhoea was more marked than vomiting.

Roughly classing all the cases into four degrees of severity—slight, chronic, acute, and extreme—no cases of this infection are found in the "slight," few in the "chronic," and very many in the "extreme." These cases generally die quickly, a few recover quickly; if they linger on they are apt to become mixed infections.

The average duration was three weeks.

As described here, it would seem hard to foresee the bacteriological finding in any one case, but the Resident or Sister could generally make a very good attempt at it, and the pathologist could speak with some degree of certainty.

The post-mortem findings were fairly constant. In this class the large bowel was specially affected, and only the last feet of the small intestine showed any marked change. The inflammation tended to pick out the lymphoid structures, ulceration and erosion of the mucous coat were marked with frequently a peculiar sticky coat of inflammatory products on the eroded parts. Points of haemorrhage were common, and the bowel-coat was oftened thickened.

The mesenteric glands and the spleen were often swollen.

Class II.—The next most important infection was a Gaertner-like bacillus. Rarely this was found in great numbers in cases of extraordinarily sudden onset and death, but in the great majority of cases the onset was not sudden.

By the time the trouble was recognized bacteriologically the child was wasted, but seldom overwhelmingly toxic. Fever was not so marked as in Class I. Vomiting was often more prominent than diarrhoea in the initial stages.

Blood was not commonly seen in the stools, but mucus and mucopus appeared in the later stages. These cases tended to drift on to chronicity. The average duration was put down as five or six weeks, but as this generally depended on the mother's statement it is probably very inaccurate.

Post mortem both small and large intestines were affected. The inflammation did not seem to pick out the lymphoid structures, seldom went on to ulceration, and seldom showed haemorrhagic changes. The bowel-wall tended to become thin and transparent, never thickened, as in the Shiga infections. Neither glands nor spleen were swollen.

I am indebted to Dr. H. D. Stephens for the pathological work.

Class IV.—The cases showing a Morgan-like bacillus were between Classes I and II in virulence.

Classes III and V.—It is hard to diagnose clinically the presence of these two classes, but we are forced to admit that when they are present in large numbers the child is extremely ill; and, moreover, repeated examinations of such children have often failed to show any recognizable cause for their illness.

In chronic cases the slow fermenter is very commonly found, as well as Class II.

Table 2 gives some idea of the clinical severity of these infections.

TABLE 2.—Dividing all the Cases into Four Degrees of Clinical Severity.

——	Cases.	Slight.	Chronic.	Acute.	Extreme.	Mortality.
		Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Shiga and Flexner infections	59	0	10	24	66	68
Gaertner infections . .	61	12	50	28	8	53
Slow-fermenter infections . .	68	38	21	30	10	50
Morgan infections . .	17	15	45	25	15	. .
Fermenters only	50	50	25	16	10	50

It must be remembered that this classification refers to the severity of the intestinal symptoms only.

Presuming the trouble to be a bacterial infection, the next step was to make an attempt to combat it as such.

Infant Foods.—The foods in common use at the hospital were roughly examined and compared; the only point of importance in this connection that need be noticed here is that, whilst liquid foods are generally sterile, food powders are often crowded with bacteria, and must be thoroughly boiled in preparation; otherwise the baby is at the mercy of the packer.

Apart from this point, the choice of food depends on the age and idiosyncrasy of the baby. Milk-intolerance, however, stands out as a clinical fact difficult of laboratory explanation; the swift disaster following a rapid return to milk is constantly striking, but more strange still is the bad effect of even a few teaspoonsful of citrated milk on a baby whose acute attack has evidently passed off. Without attempting to explain this, we must, in passing, remember that milk is a serum, and a foreign serum, and not merely a food of a certain percentage composition.

As the substitutes are still very unsatisfactory, our method is to return to milk teaspoonful by teaspoonful and re-educate the child in milk-digestion. This may take weeks, or may prove impossible in hot weather.

Local Applications.—In cultivating the bacilli it was noted that the more virulent types died rapidly when the culture-medium became acid, although they lived for months in an alkaline medium. This suggested the use of an acid local application. Strong lactic-acid bowel-lavages were used (40–60 gr. to the pint), but, beyond a little local irritation, no effect was noted.

Iodine, potassium permanganate, and protargol were also used in strong solutions, but beyond the ordinary saline wash-out the only promising results obtained were with continuous saline irrigation. This is the obvious treatment of a toxaemia of bowel origin, but to carry it out taxes the skill even of the Children's Hospital nurses. However, with a hammock slung from the sides of a cot, and the tube introduced from beneath, it was managed satisfactorily and with good result.

Vaccines.—Autogenous vaccines and stock vaccines, pure and mixed, were tried gently and strenuously with no obvious effect; no bad effect was noted even with enormous doses. It is probable that we shall find as we continue to work with these bacilli that the vaccines required more delicate handling than the coccal vaccines: with shorter sterilizing time and increased dosage we may still get results. The use of a vaccine presupposes a resistance to be stimulated, and these children seldom have the resistance when admitted, and are generally dead or recovering by the time an autogenous vaccine can be prepared. The more chronic cases speedily become very mixed infections, and so complicate the question of vaccination.

Antitoxic Milk.—It has long been known that fresh milk has some bactericidal action, and in testing the growth of these bacilli on fresh milk it was soon noticed that this action was extremely variable. Most of the more virulent types were inhibited in their growth by fresh milk, but many were killed outright. Moreover, it was soon seen that milk from one cow killed one germ and not another, even of the same type; and, in fact, each cow's milk had its own peculiar effect on each germ. The question then arose as to how these cows acquired these differing bactericidal powers. It seemed likely that they possessed power only over those germs that they had met with, and not over others; this suggested that the power might be cultivated.

TABLE 3.—Growth of the Bacilli on Milk.

Cow.	Bacillus.	Number of Colonies on Fresh Milk (Ordinary).	Milk pasteurised Thirty Minutes at 60° C.	Boiled Five Minutes.
A	Flexner ..	0	32	300
	Gaertner ..	44	200	1,000
				Brought to the boil.
B	Shiga	0	..	45
	Flexner ..	500	..	500
	Gaertner ..	450	..	500
C	Shiga	0	..	22
	Flexner ..	40	..	80
	Gaertner ..	110	..	400
D	Shiga	0	..	10
	Flexner ..	250	..	800
	Gaertner ..	250	..	250

Three cows some weeks from calving were selected, and enormous quantities of vaccine, made from twenty-one stock cultures, injected; then living broth cultures were injected, and finally living broth cultures thickened with living agar cultures. This mixture was injected at seven- or ten-day intervals, in increasing quantities, checked only by local bulk reaction. No general reaction whatever was obtained. The cows were not affected in health during an eight-weeks course of injections.

The milk and serum were then tested. Neither showed living bacilli. The injections had not altered the milk's bactericidal powers apparently; but in the hope that an antitoxin might be excreted in it, it was fed to the babies, and where milk was not tolerated the whey was used. It is extremely hard to test such a theory, but in a disease such as this, with a mortality of 70 per cent., nothing but an obvious and immediate beneficial result can satisfy us, and this we did not get.

The serum agglutinated all the stock bacilli strongly, and the addition of serum to broth prevented the growth of many and inhibited the growth of all the Shiga type. The Gaertner and slow-fermenter types seemed unaffected by it.

TABLE 4.—Effect of adding the Antitoxic Serum to Broth.

Slow fermenters ..	Grown on equal parts broth and serum	Growth profuse.
Liquefiers of gelatine ..	,, ,,	,, scanty.
Gaertner	,, ,,	,, profuse.
Flexner h_2	Grown on 1 of serum in 3 of broth ..	No growth.
,, y_2	,, ,, ..	,,
Shiga q_1	,, ,, ..	Scanty.
,, m_2	,, ,, ..	,,
,, b_2	,, ,, ..	Many colonies.
,, o_1	Grown on 1 of serum in 8 of broth ..	Scanty.
,, s_1	,, ,, ..	No growth.

The absence of reaction in the cow promises badly for the antitoxin, but, nevertheless, there are some 300 oz. bottled and ready for the next season, and it will be given a fair trial.

The work done up to this point has not been thorough enough to allow us to be dogmatic about the source of infection in these cases.

Examination of milking-utensils, milk, cowdung, &c., have given negative results. With me, fly-examinations have also been negative, but Dr. Bull has found these types in fly-infected milk.

Nevertheless, we have a few facts that guide us in our theorizing.

Even a little work done on adult diarrhoea has been sufficient to show that a chronic and severe diarrhoea may continue for months without the appearance of any of these types in the stools ; and therefore it seems unlikely that they appear as the result of a diarrhoea.

On the other hand, in many obscure abdominal conditions they may be present in great numbers. These cases are, of course, well known clinically as paratyphoid or food-poisoning cases; and I would like to point out that in such cases it is not one or two well-defined types that are described, but rather a number of allied types, and it is often only by the absorption method of testing its agglutination properties that any one type can be classified bacteriologically. In other words, these types are quite as variable as those found in the children. Moreover, there are cases of constipation, malaise, "biliousness," irregularity of bowel-action occurring in comparatively healthy people where an examination of the stool shows these types in almost pure culture. It might easily prove that cases classified as auto-infection and many of the lesser dietetic troubles of civilization are to be traced to a change in the intestinal flora.

In the few cases of chronic dietetic troubles of young children examined, cases of mucous colitis or "starch dyspepsia," the common *Colon bacillus* has been practically absent, and some of these types substituted.

The more virulent types are commonly met with both in adults and children in connection with acute diarrhoea, particularly when this is accompanied by tenesmus and blood-stained stools.

Moreover, after the tenth day of typhoid the bacilli of Classes III and V swarm in such numbers in the stools that the isolation of *B. typhosus* may be difficult or impossible.

It is obvious, therefore, that sources of direct infection are only too plentiful, and it seems likely that they may exist in adult and child without very prominent or urgent symptoms.

It may easily prove that whereas in the adult they can only develop virulence when aided by some other weakening factor, in the baby who has not had any previous practice in combating them they may produce an overwhelming toxaemia.

Surrounded by so many "carriers," infection would be an extremely simple matter—floor-fouled "comforters," tooth-searching fingers, rattles, bottles, and, in fact, any article handled by an adult "carrier," might give the disease to the baby.

Perhaps the breast-fed baby escapes so often not because the opportunity for infection is not offered, but because he is strong enough to overcome it, or because the fresh breast-milk of a semi-immune mother has bactericidal properties.

Milk-infection is of course very likely, but there seem to be other avenues of infection even more important. Great interest might attend an investigation of the intestinal flora in the chronic indigestions of older children, and also of the mothers of gastro-enteric cases.

A wide field might be opened up correlating many diseases now thought to be distinct clinical entities. Obstinate constipation or auto-infection in the adult, mucous colitis in the child, and chronic enteritis in the baby might possibly prove to be one infection in patients whose resistance varies with their age.

Comparison of Clinical Severity of Ten Consecutive Cases taken from the Shiga-Flexner Lists, Gaertner Lists and "Bac. Coli. Communis only" Lists.

(Analysis of Thirty Cases, 1911–12, Table 5.)

Case.	Age, in Months.	Day of Exam.	Duration, in Days.	Result.	Tempera-tures.	Weight—lb. oz.	Number and Character of Stools.	Vomiting.	Clinically it looks like	Agglutin-ation.	Remarks.
Cases showing Shiga or Flexner Infection.											
1	7	p.m.	11	×	97–100·4°	..	10–12 Blood at onset	Marked	Extremely virulent infection	°	Plate showed 87 per cent. Flexner B.
10	10	10	21	Dis.	97–100°	20·4–20	3–4 Blood	Rare	Sharp infection in strong child	+	37 per cent. Flexner B.
13	7	21	49	×	99–103°	8·8–9·8	7–8 Mucus, no blood	None	Sharp ternunal infection	+	Gaertner B. present first, later 6 per cent. Flexner B.
16	7	12	35	Dis.	96–100°	13–10·5	6–7 Blood and mucopus very bad	Marked	Extremely virulent infection in strong child	+	
24	11	4	..	×	101–104°	18·12–18·8	6–7 Blood mucopus and tenesmus	None	Extreme infection in strong child	+	Sudden death, with nervous symptoms.
30	8	11	28	×	101–103°	13·6–11·12	8–10 Blood mucopus bad	Marked	Very acute infection	+	
62	1½	6	6	×	101°	5·8	8 Not bad, not time to react	None	Acute infection in weak child	°	
80	8	24	50	×	100–102°	10·4–8·2	4–5 Blood and mucus	Marked	Sharp infection in weak child	°	A second exam. showed great increase in number of B.
27	4	6	14	×	96–99°	9–8·8	7–8 Mucopus with little blood	,,	Acute ending to chronic infection	—	
38	5	49	56	×	98–103°	6·7–6	6–7 Mucus and blood	,,	,, ,,	°	
Cases showing Gaertner Infection.											
17	5	30	42	×	97–102°	7·4–6·14	7–8 Blood occasional	Marked	Chronic infection ending in broncho-pneumonia	—	70 per cent. Gaertner B.
28	3	10	50	×	97–99°	6·8–6·8	6–7 Not bad	Rare	Chronic marasmic	+	30 per cent. Gaertner B.
37	4	60	90	×	Final rise	8·2–7·12	4–5 Never bad	,,	Chronic infection	—	60 per cent. Gaertner B. on two examinations.
40	4	30	90	Dis.	99°	8·9	3–7 ,,	Marked	,,	+	Mixed with slow fermenter.
36	13	28	56	×	101°	21–18	5–10 Mucus never bad	Paroxysmal	Chronic infection in big child	°	
51	15	6	20	Dis.	Initial 100°	15–16	8–9 Not bad, cleared quickly	Little	Mild infection in weak child	—	
18	2	8	13	×	99·6°	7·14–7·6	5–6 Never bad	Final	Weaning trouble in weak child	°	
19	6	4	60	×	Final rise	11–8	7–8 Mucus, finally blood	Marked	Chronic infection ending sharply	°	
23	10	4	11	Dis.	99·2°	18·8–17·4	7 Little blood	None	Slight infection in strong child	°	10 per cent. Gaertner first exam., clear on sixth day.
26	5	8	20	×	101–103°	11–10	6–9 Mucus	Occasional	Acute infection in weak child	..	98 per cent. Gaertner.
Cases in which no recognisable Bacillus was found, except the B coli. communis.											
5	5	16	42	Dis.	Normal	15–14·6	4–6 Never bad	Occasional	Milk-upset slowly overcome	—	
6	3	10	42	×	97–101°	6·6–5·8	5–6 Mucus not bad	,,	Weak infection in marasmic	°	
8	3	14	18	Dis.	97–100°	5·9–6·5	3–5 Never bad	Rare	Difficulty in weaning	°	
21	5	14	28	Dis.	Normal	..	7–6 Little blood never bad	,,	Bad feeding	°	
33	13	6	6	×	100°	..	Offensive liquid	Marked	Sudden toxaemia acute infection	°	Convulsions, cocci prominent.
34	4	24	35	×	Final rise	7·4–7·6	2–10 Not bad till final burst	Occasional	Lienteric diarrhoea	°	
39	14	5	9	Dis.	97–99·6	20	1–3 Never bad	Little	Temporary upset	+	
49	1	5	12	×	None	4–3·12	7–8 ,,	,,	Too feeble to digest cow's milk	°	
50	8	8	16	Dis.	99°	8–9	5–3 Initial blood	Initial	Trifling upset in weak child	°	Improved at once.
79	15	35	50	Dis.	None	15·8–14·4	4–5 Never bad	Little	Seen at the end of an infection	°	

× = died. Dis. = discharged. + = positive agglutination. — = negative agglutination. ° = agglutination not tried.

HERNIA IN INFANTS.

By R. Hamilton Russell, F.R.C.S. (Eng.),
Senior Surgeon to the Alfred Hospital, Melbourne.

When I was asked by the secretary of this section to open a discussion on the subject of hernia in infancy and its treatment, my first impression was that I should have some difficulty in finding material of a genuinely debatable character such as would afford one an opportunity of profitably inviting the views of those who are specially experienced in the surgical treatment of very young children. However, as I think it probable that there are still some, at any rate, among us who do not feel able unreservedly to accept the saccular theory of hernia, and its logical outcome as applied to infants, I will go back a little to the views that were universally accepted on the subject only a few years ago, and then submit for discussion the extent of the change in our procedure that more recent views on the etiology of hernia have warranted. The old rule—that hernia in an infant that could be by any means thoroughly controlled by a truss should not be operated upon, because such hernia can frequently be cured by a truss—is still held by many, and acted upon; and in former days such reasoning was good and the practice well founded; but the conditions that rendered this so no longer obtain. We now know that, roughly, 23 per cent. of individuals are predisposed to hernia through the presence of one or more hernial sacs in the commoner seats of hernia, the inguinal or femoral canals; and unless it can in any way be shown that the sac in the case of an infant can be made to disappear in addition to the actual hernia, the curing of an infant by means of truss simply means that he enters the ranks of the 23-per-cent. predisposed people. Moreover, it is reasonable to assume that, arguing from the fact of his having already had a hernia, he is more likely to again become the subject of hernia than are his fellows of the 23-per-cent. predisposed who have never had hernia at all; and if this be so, we must write him down as being predisposed in a high degree.

Now, is there any reason to suppose that the sac of a hernia may undergo obliteration? I am aware of no direct evidence in favour of this belief, but there is abundant evidence that in infants in whom hernia has been "cured" by the use of a truss, the sac has been found to be present when looked for post mortem. So that we are in a position to state positively that obliteration of the sac as the result of truss treatment is at the best most improbable, and is certainly not an event upon which we should be justified in reckoning. Moreover, there are very definite disadvantages to enter up against truss treatment; thus, it is difficult and prolonged, it requires a high degree of intelligence and devotion and constant supervision on the part of the mother. These perhaps are hardly disadvantages, strictly speaking, but the simple fact is that they may be lacking. There is, however, one very distinct disadvantage, which is scarcely recognized as fully as it might be, which is that a successful operation is far better for the baby in respect of its immediate health than the constant fret of truss treatment.

My colleagues at the Melbourne Children's Hospital will, I know, confirm an observation I made long ago as to the remarkable improvement in a baby's thriving and general well-being after a hernia is cured by operation. There is no doubt that the presence of a hernia has a much more disturbing effect on an infant's nutrition that we are apt to suppose; and a fretful crying infant that seems to be in a constant state of strain, so that the hernia is almost impossible to control, will almost invariably change quite dramatically for the better in this respect as soon as the rupture is abolished by operation. There can be no comparison, in my opinion, between the benefits accruing from a successful operation in an infant and those resulting from the most skilful and successful treatment by a truss, both in respect of the immediate and remote effects on the child's well-being.

The question then arises, What are the contra-indications to operation in an infant? Are there any special rules as to the age at which it should be undertaken or refrained from? There is no doubt that operation on a very young infant for hernia is a thing from which almost instinctively the surgeon shrinks; but he will cease to do so as soon as he has grasped a few cardinal facts, and acquired by practice a certain operative proficiency. The fear of operation is but a survival handed down from the days only recently passed, it is true, when our views as to the nature of hernia and the nature of the operation required for its cure were both faulty and vague. It is only some fifteen years since I ventured, in defiance of all accepted dogma, to advocate immediate operation as the proper course in every case of hernia in childhood; and it was not surprising that this advocacy should have seemed to lay me open to the charge of operation mania, for it was not known at that time what the cause of hernia really was, and that being so, it was quite rightly held that if the cause was unknown the proposed remedy could hardly be depended upon and trustworthy. In addition, there was the undoubted fact that the operation was a very delicate matter, and, as ordinarily performed, a very difficult matter; the parts involved very fragile, small, important, and easily damaged beyond repair; and a child prone to develop fatal peritonitis from a mishap that an adult would weather through without much difficulty.

The effect, however, of modern views as to the etiology of hernia, and the precise nature of the operation that is requisite and sufficient for its cure, has been to so greatly simplify the procedure as to render it almost free from risk. My own method that has been gradually evolved may be briefly indicated, and first I would enumerate the three chief risks of the operation that have to be guarded against. The first is the danger to the integrity of the vas, for the vas in a young infant is about the size and consistence of a thread of vermicelli; it is very easily torn across, and such an accident would involve permanent loss of function of the testis. This, which is the least of the risks involved, is nevertheless quite serious enough, and can only be safely evaded by practice and delicacy of manipulation. The other two risks which directly threaten life are suppuration of the ligature and, most dangerous of all, inclusion of a portion of the bladder in the ligature. These two great causes of danger I have eliminated in the most complete manner, as it would seem, by not employing any ligature at all. My plan is as follows: Having carefully separated the vas and the vessels from the sac, the extremity of the sac is seized in a pressure forceps and pulled firmly outwards, while the neck is cleared of adherent tissues, including the vas and vessels, which are separated by the finger-tip and forceps well up to the inner mouth of the canal. The sac is then tightly twisted up until it is converted into a mere thread, like a piece of thick catgut. This firm torsioning of the sac has the very great advantage that it defines with absolute clearness the lowermost extremity of the thickening that may contain the bladder, and if this is borne in mind it becomes practically impossible to make the dangerous mistake of injuring the bladder ; or, in other words, it defines the upper extremity of the sac with perfect clearness, and this is the spot where under ordinary circumstances the ligature would be applied. Instead, however, of applying a ligature, I apply a crushing forceps at this spot ; in an infant an ordinary artery forceps is always used. A second forceps is applied immediately below for the purpose of extra security, and the rest of the sac is cut off. The forceps are left in position thus for two or three minutes, then taken off, and the crushed stump allowed to fall back into the abdomen. The external wound is then closed with a subcuticular suture of silkworm-gut and a single layer of gauze and collodion applied. Thus, it will be seen that when the operation is completed no ligature or other foreign body is left in the wound, the patient is simply minus the sac and plus nothing. I have practised this simple method of operating in infants exclusively for the last eight years without serious contretemps of any kind, and I can confidently recommend it as the safest and best procedure, in my opinion. Then as to the after-treatment. Should the baby be left free to kick his legs about, or should some controlling appliance be used ? I have tried both plans, but I have concluded with a very decided preference for the latter plan. I always use a piece of poroplastic felt cut in a somewhat tapering form so that the upper portion will embrace the infant's thorax laterally, and the lower extremity reaches to the ankle. This, well padded with wool and moulded to the little body and limb, makes a very comfortable and manageable appliance. If the baby is on the breast it is not taken into the hospital, but treated as an out-patient, the mother being instructed to bring it up daily for inspection. The subcuticular stitch is removed on the third or fourth day without removing the collodion, provided that this has not become soddened and loosened with urine.

The operation for hernia in infancy is in some respects simpler than the operation in adults ; I refer chiefly to the fact that the complications and varieties met with are fewer in number. I must, however, refer to one or two.

(1.) Where the funicular process is open throughout, so that the tunica vaginalis is free to receive the herniated bowel (total funicular hernia, as I term it), the operator must be prepared with his method. Briefly, he must divide the funicular process at some point and then treat the upper portion as the sac, stripping it up from the structures of the cord, torsioning and crushing it in the way I have described. The lower portion leading in to the tunica vaginalis requires no treatment, and this may be disregarded.

(2.) A very difficult variety of hernia to deal with will be congenital hernia of the caecum. There are two kinds of hernia of the caecum, one in which the caecum freely mobile happens to descend into a hernial sac ; the other, which I think should be distinguished as true congenital hernia of the caecum, in which the caecum is developmentally placed outside the abdomen in the scrotum. In this latter case the caecum is a fixture to the wall of the sac, which in itself renders it irreducible ; moreover, the inguinal canal is far too narrow to permit the passage along it of the caecum, even if the latter were mobilized sufficiently to permit of its return, or, rather, of its introduction into the abdomen. In an adult where this arrangement is present it is generally possible to cut the caecum, with the adjacent portion of the sac-wall, out of the sac by running a scissors up the sac on either side of the prolapsed bowel ; then, by returning the caecum and tying off the remainder of the sac in a special way, the operation is completed satisfactorily.

In an infant, however, my experience has been that owing to the flimsiness of the sac my attempts to deal with it in this way have invariably resulted in the sac being torn to shreds ; in fact, it has virtually disappeared under my manipulations, so that there is nothing left to twist or tie off. This, I consider, need cause no uneasiness to the operator, for the hernia in this case has not really been dependent on the presence of a pre-existing sac at all ; in fact, it is doubtful whether, strictly speaking, it should not be designated rather a congenital malposition of the viscus than a hernia proper. In any case, the operator has to get the caecum into the abdomen. The simplest and best way to do this is to dilate the inguinal canal gently but firmly by insinuating first the little finger and then, if necessary, the index-finger along by the side of the misplaced caecum into the abdomen. This will render it possible to push the caecum into the abdominal cavity, a proceeding which will be facilitated by holding up the child in what Mr. Murray humorously describes as the position depicted in "The Judgment of Solomon." It will thus be seen that in this case there will be an opening leading directly from the wound into the peritoneal cavity, an opening which it is practically impossible to close by ligature or torsion. In such a case as this it is my practice, after closing the wound and applying the dressings in the usual way, to apply over all an elastic bandage so adjusted as to exert gentle but equable pressure upon the inguinal canal. I have never known a failure or bad result of any kind to follow upon this procedure.

There is only one other complication of hernia that I will briefly allude to, and that is retention or imperfect descent of the testis, although in my experience it has been rare to have to deal with such cases in very young infants ; as a rule, for some reason that I cannot explain quite to my satisfaction, cases in which this defect is present are somewhat older before they come for surgical treatment. Boys in whom the testis is incompletely descended almost invariably have the funicular process completely patent, and frequently a peritoneal diverticulum passes outwards and lies between two of the layers of the abdominal wall, or, more frequently still, on the surface of the external oblique. Several questions arise out of this complication, but I shall only deal very directly with two of the elemental ones : (1) When imperfect descent of the testis is uncomplicated by hernia ; (2) when hernia is present as a complication. The first is easily answered. Where there is no hernia there is no indication for any operation in a young infant ; any operation that may become necessary can be more advantageously undertaken later on ; an infant suffers no inconvenience from a misplaced testis ; and there is good reason for expecting considerable descent of the testis during the period of growth. The second question, as to what should be done when hernia coexists with imperfect descent of the testis, cannot be answered quite so simply and concisely. As a general rule, if the hernia is marked the funicular process should be dealt with in the way I have described, and the hernia cured. When the testis is fairly well developed and can be brought outside the external ring, it should be left there and the structures of the cord not interfered with. However rudimentary the testis may appear, it will be worth preserving, if possible, even when there is a normal testis on the opposite side ; and the way that a rudimentary testis will descend and develop at puberty is surprising, even although it may never functionate and be only half-size. When both testes are retained and imperfect it is needless to say that the utmost care should be taken to preserve both. Any operation for rectifying the misplacement of the testes, if it is to be undertaken at all, should be postponed until puberty has been passed, unless the inconvenience suffered by the patient should render operation imperative at an earlier period.

DISCUSSION.

Dr. Bruton Sweet (Auckland), whilst admitting the excellent results obtained by Mr. Hamilton Russell, deprecated operation as a routine on young infants when other less dangerous means gave rise to equally satisfactory results. It could not be said with authority that operation was entirely without certain risks. Cases of atrophy of the testicle, due to injury of the vas deferens or spermatic vessels, had come under his notice. Even the admission of a young baby to a hospital, especially during the summer months, was fraught with danger to the infant, owing to the possibility of its becoming infected with gastro-enteritis or some other affection. He had had considerable experience in the use of the woollen truss, and the results obtained were most satisfactory. Granted that a hernia cured by truss treatment may return when the patient reaches adult life, can it be proved that cases treated by operation do not also recur ? How many of Mr. Russell's cases have grown up to manhood ? With reference to the statement that the sac does not disappear as a result of truss treatment : Some years ago Edred Corner proved, at any rate to his own satisfaction, that the sacs in inguinal hernias did actually disappear after a truss had been worn for some months. We know that this is so in the case of umbilical hernias and divarication of the recti abdominis ; so it is not unreasonable to imagine that it is also possible in some cases of inguinal hernias. The woollen truss when properly applied causes no discomfort or irritation of the skin, and is simple and safe. In his (Dr. Sweet's) opinion, operations should not be performed in children below the age of two years, except—(1) In the case of large (usually caecal) hernias which cannot be kept up with a truss ; (2) neglected children whose parents or guardians cannot or will not carry out truss treatment efficiently ; or (3) in the rare case of strangulated hernias.

An interesting discussion followed, in which the following took part : Dr. Fergus Paterson (New Zealand) ; Dr. Mackie Begg (Wellington, New Zealand) ; Dr. Holmes (Wellington, New Zealand) ; Dr. Munro (Edinburgh) ; Dr. Jeffreys Wood (Melbourne) ; Dr. Wilson (Hastings, New Zealand) ; Dr. J. Morton (Sydney) ; Dr. W. F. Litchfield (Sydney).

A majority of the speakers favoured operation.

Mr. Hamilton Russell replied.

CLINICAL MEETING.

Dr. Bruton Sweet exhibited the following cases: Sporadic cretinism (four cases), Hirschsprung's disease, hydrocephalus, deformity of chest (funnel-chest), and pellagra.

Sporadic Cretinism.—The cases were all young female children. They came under observation at the following ages, viz.: two years three months, fourteen months, ten months, and five months. Photographs were exhibited showing the effects of thyroid treatment. The first two had supra-clavicular pads of fat, which soon disappeared when treated. All had improved greatly, both physically and mentally. The youngest one was now apparently a normal child in every respect, but the others were still somewhat backward mentally when compared with average children of the same age.

Hirschsprung's Disease (congenital idiopathic dilation of colon).—Male, aged two years two months. Was seen when one month old.

History: Had a very large abdomen when born, and this has rapidly increased in size. Bowels have never acted without aperient or enema.

The family history is interesting. Father has been operated upon for appendicitis; mother has suffered from membranous colitis, has had an appendectomy done, and since then has remained well. She has had eight children, two by a former husband, who both died: one at the age of twelve months, of bronchitis; and the other, *when nine weeks old*, of sarcoma of liver. In the case of the latter the abdomen was very greatly enlarged, and no autopsy was made, so it appears not improbable that this, too, was a case Hirschsprung's disease.

Of the six children by the second husband, the eldest two are living, and quite healthy, now aged ten and eight years. The third child died at the *age of nine weeks* of a similar condition to the patient. The fourth died aged eight months, of colitis; and the fifth is living, but suffered severely from colitis when a year old.

Condition when first seen: A small baby, with enormously distended abdomen. The skin was greatly stretched, and percussion gave a tympanitic note everywhere, the liver-dullness being absent. The penis, scrotum, and anus were of a purplish hue, owing to venous congestion. The sphincter ani was tightly contracted. With some difficulty the little finger was introduced into the rectum. The internal sphincter was much hypertrophied, and on passing this the finger entered a large cavity, the sides of which could not be touched.

Treatment: The sphincter was stretched daily at first with the little finger, and later with the index-finger. Improvement was rapid. After the first stretching the bowels moved about twelve times in the next twenty-four hours, and the abdominal distension was greatly reduced. A fortnight later the appearance of the abdomen was normal. The patient has remained well, and is now a fine healthy child.

Congenital Deformity of Chest.—R. B.; male, aged two years. Has a funnel-shaped depression at the lower end of sternum. During deep inspiration the depression is greatly deepened. The deformity has been present since birth, and the child's health is not affected. No signs of rickets, or enlarged tonsils, or adenoids. Father and one uncle are similarly affected.

Hydrocephalus.—E. J.; female, aged six years; cannot sit up, owing to size and weight of head; anterior fontanelle still unclosed. The head is dome-shaped ; circumference, 26 in. Intelligence fair ; nutrition and development good ; both lower and right upper limbs are spastic.

This patient has been under observation since the age of five months. First child. Mother had three miscarriages previous to birth of patient. Head said to be of normal size at birth, but since then has rapidly increased in size.

General health has always been good, and the patient is happy and contented. Hearing and sight are both normal.

Pellagra.—Female, aged four years. First came under observation in April, 1913.

History : Health apparently quite good until fifteen months previously (January, 1912), when was taken into the park on a very hot day. Became sunburnt on face, hands, and arms, and a small patch on exposed part of legs. Next day became feverish, and vomited, and the "sun burn" has remained more or less ever since, nearly disappearing in the winter months and reappearing in the spring. Is not bright mentally, and does not speak so well as she did before onset of illness, and has not gained weight since then. Has had no previous illness. Has always lived in Auckland. Has never eaten maize or maizena, and has had very little cornflour.

Family history : Youngest of five children. Father, mother, brothers, and sisters all alive and in good health.

On examination (April, 1913) : Poorly nourished child ; weight, with clothes, 25 lb. The skin of whole of face except the forehead, where covered with a fringe of hair, is bright scarlet in colour, shiny, dry, and scaly ; the back of hands and extensor aspect of arms, to within 2 in. of the elbow, is similarly affected. On the front of the legs (between frock and sock) there is a patch of dry, scaly skin, which is slightly reddened. The skin of the rest of the body is quite normal. Appetite poor ; will take nothing but milk and bread and butter. Bowels constipated ; is dull and apathetic ; easily gets tired ; walks with head forward and neck somewhat arched ; knee-jerks increased ; sleeps badly, and is very restless at night and irritable in the day.

6th May : It was noticed that she was becoming spiteful, and not so cleanly in her habits. Has every day had slight convulsive seizures, in which she momentarily lost consciousness and fell to one side or backwards.

15th May : Considerable improvement in dermatitis, and the "turns" were less frequent and severe.

17th June : Was seen suffering from catarrhal jaundice ; skin of face and arms somewhat dry and scaly, but very greatly improved.

22nd September : Remained well until three weeks ago, when dermatitis reappeared, and is now as bad as ever. Bowels, which had been regular, are now constipated. Only now has "turns" when constipated.

Subsequent remarks : From this date, which, it may be noted, is about the onset of the spring in Auckland, the patient has been growing slowly and steadily worse.* The dermatitis is now well marked, and has invaded the flexor aspects of arms. The mental condition is becoming worse. The fits are frequent, and she has had two severe epileptiform convulsions. The lower limbs are now quite spastic, and the patient cannot walk or stand without support. Babinski's sign is well marked.

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* Death occurred on the 25th March, 1914.

RICKETS IN SCHOOL-CHILDREN: FREQUENCY, CAUSATION, AND IMPORTANCE.

By Dr. Harvey Sutton (Melbourne).

Method of Inquiry.—From the outset parents have been asked by means of a " Circular to Parents " to state, among other things, how long the child has been breast-fed, and at what month artificial feeding was begun, and with what food. A large percentage of replies, nearly 80 per cent., was received. The bulk of the failures to fill in an answer were due either to want of memory, as often stated, or to the father filling in the card, the mother not being available at the time to give the information. On the whole, the response was a satisfactory one, though it is probable that the percentage of artificial feeding given is a minimum, as a certain reticence tends to prevent some parents from giving details.

Quite independently of this information, the children were examined, and structural bone-alterations, such as deformities of the chest and spine, of the extremities (knock-knees, bow-legs), of the head (square skull) were noted, as well as other manifestations (rachitic teeth, rib-beading, " pot-belly," enlarged liver and spleen, and recently certain types of malnutrition), and an estimate was recorded as to whether rickets was definitely or probably present, and whether marked or mild in degree.

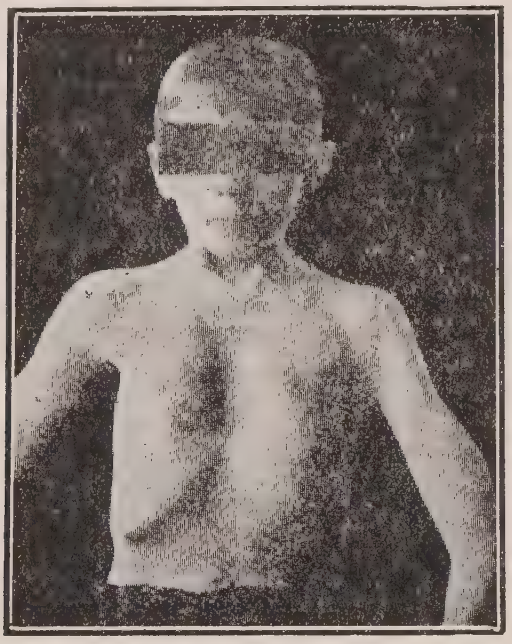
Results.—The two estimates thus independently obtained have now been correlated. Out of a total of 1,682 boys examined, no information was returned from 355. Of the remaining 1,327, there were 355 (26 per cent.) with rickets. In 245 (18 per cent.) artificial feeding had been begun before six months of age, and, of these children, 108—that is, 40 per cent.—suffered from rickets, often in a marked degree. Similar results have been obtained in the girls.

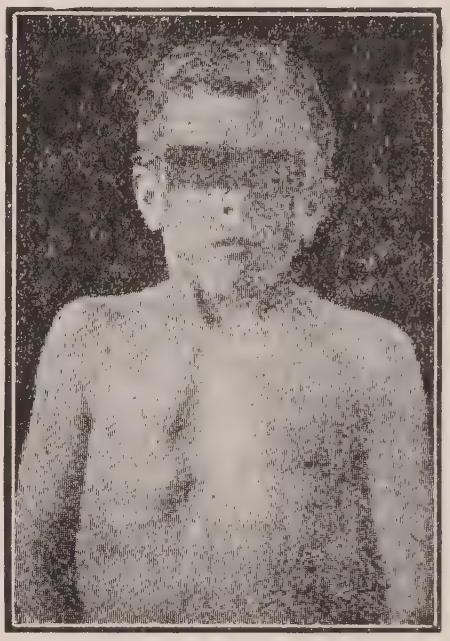
In those who had been artificially fed before six months, thirty-nine (48 per cent.) had rickets; in the breast-fed, over six months, only 17·5 to 26·6 per cent. This latter total included very few, if any, with marked degrees of the defect, and, further, it is probable that many of these received some artificial feeding as well. A rise in the curve shows that prolonged lactation—*i.e.*, breast-feeding eighteen to twenty-four months or over—was also associated with an increased incidence of rickets.

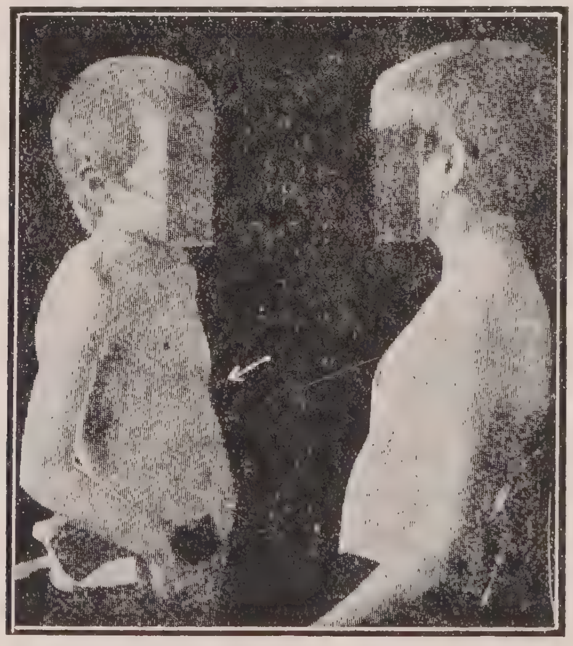
It is obvious that the child brought up on the bottle (artificial feeding before six months) is twice as likely to suffer from rickets, often in marked degree, than the child normally fed on the breast.

Another factor also associated with rickets is defective hygienic conditions—*e.g.*, overcrowding, ill-ventilated bedrooms, &c. We hope to furnish figures on this at a later date. The predominant factor, however, is artificial feeding, especially with patent foods. Two-fifths (40 per cent.) of all children fed on patent foods get rickets (independent of the duration of breast-feeding), and even though the social conditions are good—*e.g.*, at Essendon and Collingwood—rickets still appears in conjunction with artificial feeding begun too early in life.

Nature of Rickets.—The condition of rickets is only slowly receiving its proper recognition as influencing the school life of children. Previously, it has almost entirely been regarded as affecting children during the second year of life. When, as the result of the dietetic and hygienic errors already noted, children are backward in development, walking late, going "off their feet," thickenings appear about the cartilaginous ends of bones, with various deformities of arms and legs—for examples, bow-legs, knock-knee. These children suffer from digestive troubles, and distension of the abdomen ("pot-belly") occurs. They are restless, sweat very much in the head, and kick off the clothes at night-time. In many ways they are a nuisance to themselves and their parents.


(1.) Irregularity of the chest.


(2.) Pigeon-chest, and grooves on the ribs (Harrison's sulcus).


(3.) Depressed sternum.

Photographs of Elementary-school Boys, showing Effects of Rickets on Bodily Development.

Importance in School Life.—All this has been well recognized, but what does not seem to be so generally realized is the great frequency of mild degrees of rickets—about one-fourth of all children examined—and the distinct association of the disease with school life, chiefly marked by its influence on bone and brain. Rickets, we consider, is responsible for most deformities in school-children, especially those due to postural influences and of chest, spine, head, and legs—for example, pigeon-chest, funnel-chest, grooved chest (Harrison's sulcus), guttered or depressed sternum, posterior, and lateral curvature of the spine, the square head (which looks big but whose measurements do not confirm this), bow-legs, and knock-knees.

It supplies the hidden factor which explains why, though all children sit in the same desks without back, and of the same height of seat for very differently sized children, only a certain proportion—though a large one, about 15 to 20 per cent.—develop deformity as the result. It is the abnormal plasticity of the poorly formed cartilage and bone that renders the rickety child susceptible, and deformity is further greatly assisted by the unusual laxity of ligaments, and, even more, by the remarkable hypotonicity or flabbiness of the muscles of body and limbs so characteristic of this disease.

No wonder, then, that rickets practically decides whether deformity shall occur as a result of postural influences, such as incorrect position of "attention" and "stand-at-ease," unsuitable desks, lighting from the wrong side, badly designed schoolbags, and improper one-sided methods of carrying heavy weights, such as babies, books, parcels, &c. Hence it is that so many boys and girls show these unsightly and crippling kinks and twists of their bodies and limbs. Deformities due not to rickets but to other acquired or congenital conditions, such as infantile paralysis (endemic myelitis), clubfoot (congenital talipes equinovarus), are of distinct rarity among school-children—less than 0·5 per cent. The round shoulders of the "fashionable" football "slouch" seen in older boys may also be excluded.

Nervous Instability.—On the nervous side, the rickety baby is liable to convulsions and peculiar increased irritability of nerve-structures—*e.g.*, tetany. In school life the tendency seems to render the nervous system unstable. Two main types occur—(1) The precocious, even bright, child, very nervous in temperament, prone to constipation and indigestion, with a capricious, sometimes excessive, even depraved, appetite, yet nevertheless thin and weedy in build; much of the malnutrition found in good populations (socially) has this underlying basis, and many "delicate" children fall into this category. The other type (2) is often overweight, solid and stolid, or merely fat and flabby, and then are typically dull and backward, yet still nervously unstable. These comprise a very large percentage of backward children.

It may in this way lead on to the neurasthenia of adults, and distinctly interfere with the ordinary class-work and promotion list.

Certain deformities, due to rickets, such as coxa vara or deformed pelves, affecting child-bearing in later life, are rare or not looked for.

Other important results of rickets may be briefly mentioned: Marked enamel defects of teeth, horizontal caries, honeycomb teeth, are occasionally met with. Curiously opaque crumbly stained teeth also may be due to this cause.

Superior protusion with a keel-like palate not associated with nasal obstruction is frequently rachitic in origin. This interferes with the "bite," renders the teeth ineffective as a grinding-machine, and predispose to decay (caries).

In addition, infectious diseases lie in wait for, above all others, the rickety children (except perhaps the congenital syphilitic).

For all these reasons—bony deformity, nervous instability and backwardness, dental defect, and loss of time from illness—the school-child with rickets will be seen to be suffering from a marked handicap, not merely in infancy, but right through his school life.

Two sides of the prevention of rickets may be mentioned, seeing that they are intimately associated with education of parents and of children.

The first means of prevention is the waking-up of the parents to the danger of indiscriminate resort to artificial feeding, particularly with patent foods, in place of the natural method of nourishment in early life. This occurred in at least 20 per cent. of children.

In our opinion, judging from advertisements, inquiry of chemists and grocers as to their sale, and the experience of medical practitioners as to their use, patent foods are becoming more popular, even in country districts, and in all types of the population, and are tending to be used earlier and earlier.

One cannot go fully here into the proper methods of feeding infants, but our graphs show that the normal period of breast-feeding is not less than nine or more than eighteen months, and emphasize the danger of artificial feeding before six months and of the use of patent foods. We hold that in no case should breast-feeding be discontinued before six months of age, or artificial feeding be begun, except on the definite advice of a duly qualified medical practitioner.

The present haphazard, hearsay, rule-of-thumb methods are fraught with serious lasting danger to children, and it is unfair that owing to prevalent ignorance their welfare should be at the mercy of specious high-sounding advertisements, from which alone many mothers seem to derive what knowledge they possess.

It is obvious then that definite training in the care and feeding of children should be available for every girl, every future mother; and this has been partly realized by the inclusion of this subject in the domestic-arts course in higher elementary and high schools. The second method, perhaps more in the nature of cure than prevention, is designed for the relief of deformities of the chest and spine. No method combines so many advantages as, or is so free from objection than, the use of breast-stroke swimming. Here the pectoral (breast) muscles pull out the chest into proper shape, as they contract in the forcible sweep backward of the arms. The spine is relieved of the weight of the body by the buoyancy of the water and the horizontal position of the swimmer, while the head is tilted back so as to correct round shoulders and round back. All the muscles, including the spinal muscles, are greatly strengthened and symmetrically developed, and become more efficient supports in every way. Further, the sport and pleasure induce the frequent and repeated action necessary to produce a permanent effect. We have been able to observe very great improvement even in marked deformities of chest and spine.

The extension of the teaching of swimming and the increased facilities made possible by the arrangements of the junior-cadet training under the defence scheme will be invaluable. Head teachers, we are glad to note, are, wherever possible, forming swimming-classes. It is strongly urged that these facilities should be always extended to girls as well as boys, and that the breast-stroke should always be taught, and its practice encouraged in every way.

Our conclusions are—

(1.) A large percentage (26 per cent., or one-quarter) of the children examined showed structural bone-alterations and other indications of rickets.

(2.) A child fed "on the bottle"—artificially fed before six months of age—is at least twice as likely to suffer from rickets, often in marked degree, as the child breast-fed for that period.

(3.) Two-fifths (40 per cent.) of all children fed on patent foods get rickets (including all the marked degrees of defect).

(4.) Rickets is the underlying basis which decides whether educational factors (improper desks, &c.) will produce postural defects.

(5.) Rickets, by its effect on bones and brain, is responsible in school life for the great majority of deformities, and for a large percentage of ordinary backwardness. It also causes some dental defect, and much loss of time from infectious illnesses.

(6.) Education of parents and future parents in the care and feeding of infants is a distinct necessity.

(7.) The practice of breast-stroke swimming is of the greatest value for the relief of deformities, and should be taught all children—boys and girls.

Artificial Feeding and Rickets: Three Collingwood Schools.

TABLE A.—BREAST-FEEDING IN NUMBERS. (Comparative Table of Manner of Infant-feeding and Rickets in 1,682 Boys examined at the Brunswick, Collingwood, and Essendon Schools.)

Mode of Infant-feeding, and Months.	Rickets.		Nil Rickets.	Total Boys examined.	Percentage of Rickets.	
	Definite.	(?)			Definite.	(?)
Artificial from birth ..	24	13	53	90	26·6	14·4 *41·0*
Artificial from 1 to 3 months ..	26	17	44	87	30·0	19·5 *39·5*
Artificial from 4 to 6 months ..	18	10	40	68	26·4	14·7 *41·1*
Natural feeding for 7 to 9 months	19	16	91	126	15·0	12·7 *27·7*
Natural feeding for 10 to 12 months	66	32	369	467	14·1	6·8 *20·9*
Natural feeding for 13 to 17 months	41	27	236	304	13·4	8·8 *22·2*
Natural feeding for 18 to 23 months	21	14	106	141	14·9	9·9 *24·8*
Natural feeding for 24 months and over	8	3	33	44	18·1	6·8 *24·9*
No particulars supplied ..	38	28	289	355	10·7	7·8 *18·5*
	261	160	1,261	1,682	15·5	9·6 *25·1*

Summary.

—	Rickets.—Artificial Feeding from Birth up to Six Months.		Rickets.—Natural Feeding over Six Months.		Children examined.		Total.	No Particulars given.	
	Number of Cases.	Children.	Number of Cases.	Children.	Rickets Nil.	No Particulars.		Rickets.	Children.
Brunswick ..	40	102	109	409	362	168	679	34	168
Percentage ..	..	*39·2*	..	*26·6*	..	..	..	..	*20·2*
Collingwood ..	37	78	78	445	408	101	624	11	101
Percentage ..	..	*47·4*	..	*17·5*	..	..	..	..	*10·8*
Essendon ..	31	65	60	228	202	86	379	21	86
Percentage ..	..	*47·6*	..	*26·6*	..	..	6	..	*24·4*
	108	245	247	1,082	972	355	1,682	76	355
Percentage ..	..	*40·0*	..	*22·8*	..	..	..	..	*21·4*

TABLE B.—RICKETS PERCENTAGES. (Comparative Table of Manner of Infant-feeding and Rickets in 624 Boys examined in Three Collingwood State Schools.)

Mode of Infant-feeding, and Months.	Rickets.			Rickets Nil.	Total Boys examined.	Rickets Percentage per Period.	
	(+ +)	(+)	(?)			Definite.	(?)
Artificial from birth	5	3	2	16	26	30·7	7·7
Artificial feeding from 1, 2, and 3 months	4	11	4	12	31	48·4	13·0
Artificial feeding from 4, 5, and 6 months	1	6	1	13	21	33·3	4·7
Natural feeding for 7, 8, and 9 months	—	4	2	28	34	11·7	5·8
Natural feeding for 10, 11, and 12 months	2	16	10	144	172	10·4	5·8
Natural feeding for 13 to 17 months	5	14	5	116	140	13·5	3·5
Natural feeding for 18 to 23 months	1	10	1	56	68	16·1	1·4
Natural feeding 24 months and over	..	7	1	23	31	22·5	3·2
No particulars supplied ..	..	7	4	90	101	6·9	3·9
	18	78	30	498	624	15·4	4·8

Percentage of rickets where artificial feeding commenced before six months (78 boys, 37 cases) .. .. 47·4

Percentage of rickets where natural feeding over six months (445 boys, 78 cases) .. .. 17·5

Comparative Table of Various Infant Foods and their Association with Rickets in 283 Cases of Artificial Feeding commenced before Six Months.

Name of Food (Information supplied by Parent).	Rickets.	Nil.	Children examined.	Percentage.
Allen and Hanbury's	8	12	20	..
Benger's	4	3	7	..
Biscuits and milk	4	3	7	..
Bread and milk	..	1	1	..
Barley-water and milk	6	8	14	..
Condensed milk	1	4	5	..
Cow's milk	34	51	85	40·0
Carnrick's	1	..	1	..
Goat's milk	..	1	1	..
Groats	..	1	1	..
Horlick's	3	2	5	..
Malted milk	1	2	3	..
Mutton-broth	..	1	1	..
Mellin's	8	21	29	..
Nestlé's	10	15	25	..
Neaves'	4	7	11	..
Oatmeal	1	3	4	..
Phosphatine	..	1	1	..
Robinson's	6	4	10	..
Name of food not supplied ..	17	35	52	32·5
Totals and percentage ..	108	175	283	38·1

Out of 1,816 boys and girls—

283	artificially fed.
1,156	breast-fed for seven months and upwards.
377	no particulars supplied.
1,816	total=19·6 per cent. artificially fed; 38·1 of these with rickets.

ERYTHROEDEMA.

By H. Swift, M.D. (Cantab.),

Senior Physician to the Adelaide Children's Hospital.

Erythroedema is a disease characterized by swollen bluish-red hands and feet, disordered digestion, followed by considerable muscular pareses occurring in children between the ages of six and sixteen months.

Etiology.—At present the cause is obscure. I have seen during the last two years fourteen cases; the youngest was six months and a half; the oldest was fifteen months; the majority were about nine months old when first seen. All but two had been breast-fed up to the age of incidence of the disease. The two exceptions had been weaned, one at three and the other at three months and a half, and had been reared on cow's milk and water. In none was there any suspicion of scurvy. In all there was some derangement of the digestive mechanism, leading one to conclude that the trouble is an intestinal toxaemia giving rise to an angio-neurosis.

Symptoms.—The first symptoms are generally due to derangement of the digestive apparatus; the child loses its appetite, goes off its food, and it is only with the greatest of difficulty that it can be induced to take any nourishment, so extreme is its evident distaste for food. Its bowels are open generally three or four times a day, the motions being greenish, with some undigested particles of food. Vomiting is by no means a common symptom, except undue force is used in trying to get nourishment down. Another early symptom is sleeplessness; the child sleeps very little and for very short periods, is very restless, and cries and frets a great deal.

After a few days the hands and feet are noticed to be swollen and red; but instead of being hot, as one would expect, they are cold and clammy. Owing to the want of nourishment and lack of sleep the child is now very weak and listless, dislikes being disturbed, cries when moved, but not as though it was muscle-sore, as pinching various muscles does not give rise to any pain.

The picture is very typical. The child lies out flat on its mother's lap, with flaccid arms and legs, and dorsa of hands and feet swollen and bluish-red. The skin of the trunk is often covered with a fine papular scattered discrete miliaria; the skin on palms of hands and between fingers and toes is often sodden and disquamating. The temperature is generally below normal, and the skin feels cold and clammy. The tongue is pale, and coated with a light streaky fur. There is complete distaste for any food. The abdomen is flaccid and retracted. Generally three or four small motions are passed a day, of a greenish character. The liver is not enlarged; the spleen cannot be felt. No enlarged glands are to be felt in abdomen nor in the groins or neck. The thyroid is not enlarged. The thymus cannot be felt. The pulse is small, compressible, and rapid; the first sound is feeble. The urine is scanty, pale-straw colour, neutral in reaction, and contains an excess of phosphates, but no albumen.

The most pronounced feature early in the disease is the swelling and the colour of the hands and feet. The colour is a bluish-red; it disappears on pressure, but does not return very rapidly; it does not extend above the wrist or ankles. It is cold to the touch, and in these two respects it is similar to the colour cccurring in erythromelalgia, but differing from that trouble in that there is no pain in erythroedema.

The colour and cold clammy feel are not unlike the condition frequently seen in the fingers and hands of patients suffering from peripheral neuritis, but, as a rule, in the latter disease there is not the marked swelling, but rather is there a tendency to shrinking and tapering. The oedema or swelling affects principally the dorsa of hands and feet, but the whole hand and foot are really swollen; the swelling does not pit on pressure, there is no abrupt margin, but, like the discoloration, it does not extend above the ankle and wrist joints, and it gradually fades into the rest of the tissues of arm and leg. As the general condition of the child improves, the redness and swelling disappear slowly and not in a paroxysmal manner.

The *blood* has been examined in several of the cases, and no coarse abnormality has been detected. There has been no erythroemia; rather in one case there was some diminution of red corpuscles. Although repeated efforts have been made to obtain a cultivation of some organism, so far the blood has been sterile. Swabs also were taken from the throat, nose, and ear, and in no case was the bacillus of diphtheria present.

The *alimentary system* is always deranged, and it is possible that the whole trouble is due to intestinal toxaemia, but the symptoms affecting this tract are by no means acute; they are not pronounced and predominating, but are rather of a subacute subsidiary character; and it is doubtful if any definite pathological lesion would be found. It would appear as though the digestive apparatus were in abeyance, and that, owing to a general asthenic condition, what food is taken is not properly digested, and so some increase of peristaltic action is set up to expel it.

The *urine* is noticeably lessened in quantity, so much so that mothers have been alarmed. The specific gravity is generally about 1·010. The colour is pale straw. Albumen has not been found in any case, nor has there been any sugar. Phosphates are generally in considerable excess, but the amount of urea is less than normal. No pus has been found: No *Colon bacillus*, nor tubercle, nor other pathological organism has been found.

Muscles.—The muscles of the body generally waste and lose their tone, but in no case was there complete loss of power. The larger muscles appear to be the most profoundly affected, especially the quadriceps extensor and the adductor muscles of the thigh: they waste very rapidly and deeply, so they can barely be felt to contract. The subcutaneous fat is also absorbed, so that the skin lies in folds over the bones. The glutei, the rectus abdominis, the larger muscles of the upper area are all affected. The erector spinae and the longissimus dorsi are always affected; in fact, in one case the mother consulted me because she noticed her child could no longer sit up. The muscles of the neck also shrivel, so that the head cannot be held erect for any length of time. There is no absolute paralysis, but movement is slow, and prolonged effort cannot be sustained, as the muscle rapidly tires. Recovery is very slow, and it is only after many weeks of skilful massage that the muscles recover their tone. This prolonged convalescence is one of the outstanding features of the disease. It is a complaint lasting months, not days, but in the end recovery is complete, with no loss of power remaining.

Diagnosis.—In many respects this disease has a strong resemblance to multiple symmetrical peripheral neuritis, but in many respects it differs very markedly. In both there is great muscular wasting and weakness, from which it takes a long time to recover. In both there is derangement of the vasomotor system; there is profuse sweating and alteration in the blood-supply to the hands and feet. On the other hand, in no case has the patella reflex been unobtainable: there has been no tenderness of muscles, no loss of sensation, no affection of the muscles of the orbit or palpebral fissure, no affection of the palate or tongue, or oesophagus. Although the heart has acted feebly, there has been no suspicion of failure from affection of the vagus. The diaphragm and intercostals have not been affected. The red swelling of the hands and feet is different from the red rather shrunken condition of hands in peripheral neuritis.

From erythromelalgia it may be distinguished, in that in the former, as a rule, only one hand or foot is affected, the red swelling is hot and burning, is painful and tender; the pain is increased by the application of warmth, and diminished by cold; there is no wasting of the muscular system, except perhaps in severe cases of the muscle-supply of the affected limb owing to disuse.

From Raynaud's disease, as a rule, there should be no difficulty in arriving at a diagnosis, but if a case of Raynaud's disease is seen after the initial syncope, when there may be a symmetrical dusky asphyxia of both hands or feet, there might be some confusion; but when the history is obtained, and when it is noted how extremely painful and tender the affected part is, the diagnosis is cleared up, and is confirmed later on by the changes in the discoloration, or perhaps gangrene. There is also in this condition, too, an absence of the wasting of muscles.

Congenital Heart-disease.—One mother declared her medical adviser had told her her child was suffering from congenital malformation of the heart, but there should be no trouble in eliminating this latter condition. First, there is the history; second, the appearance is entirely different, the colour is cyanotic with clubbed fingers; third, the condition of the heart; fourth, the persistence of the condition.

The toxic oedema seen in children suffering from a wasting gastro-intestinal trouble without albumen differs not in general appearance from the ordinary oedema of acute nephritis. It differs from the ordinary angio-neuroses like angio-neurotic oedema and Raynaud's disease, in that the erythroedema persists for weeks and is not of a paroxysmal character, but still it appears to be allied to them.

The *prognosis* is favourable, as all the children have recovered completely, and are alive now, with the exception of one child that remained well for two months, then unfortunately developed broncho-pneumonia and died. The relatives should be warned of the slowness of the progress to recovery, as it is generally a matter of many weeks.

Treatment.—Attention should in the first instance be directed to finding some food that the child will take and digest, and great patience is required in overcoming the very evident distaste for all kinds of nutriment. Albumen water, whey, junket, juice of raw meat, patent foods, especially those not too sweet, must all be tried in turn, until one is found the child will take. To stimulate the appetite bicarbonate of soda and tincture of gentian may be given, or some extract of malt. Warm loosely fitting woollen clothing should be worn; the surface of the body is cold, is frequently bathed in perspiration, so that it is important to avoid chills. The child should be sponged and dried rapidly, and not exposed too long. Special attention should be paid to thoroughly dry all folds of the body and between the fingers and toes where there is no breach of surface: a little spirits of wine should be dabbed on, and then a powder of zinc and starch 3 parts, and 1 part of boracic acid, applied freely. If there is much hyperoemia or much eruption or rubbing-away of cuticle the spirit must be omitted.

If the condition of skin does not improve, then an ointment of zinc, with 10 minims of liquor carbonis detergens to the ounce, should be gently applied; and any raw surface separated by applying lint with the ointment spread on it. At times the eruption gives rise to great local irritation, and, unless prevented, the child will scratch with its fingers or rub its feet together, and so set up a regular eczematous condition. To prevent this, the hands should be bandaged lightly, or placed in gloves without fingers, and the feet put in light socks; occasionally it is necessary to tie the arms and legs to the side of cot, or place light straight splints on the arms. As soon as possible regular massage by a skilled masseur should be applied not only to the affected muscles, but also to assist the circulation in the hands and feet.

Drugs.—To check the diarrhoea, castor-oil should be given in the first instance, to be followed by a mixture containing bismuth and some intestinal antiseptic—*e.g.*, R. bismuth carb. gr. v, mucilag. tragac. q.s.; resorcin gr. ii, aquae chloroform 1 drachm—every four hours. Or small doses of grey powder may be given.

For the sleeplessness, 5 grains of potassium bromide should be given; if of no avail, then a grain of Dover's powder. Sometimes a teaspoonful of castor-oil will be followed by a refreshing sleep of some hours.

All the earlier cases were given calcium, either as the chloride or lactate, in doses of 3 grains, three times daily; and at first it appeared as though it acted as a regular specific; but, unfortunately, in some cases no improvement, or very little, could be noted; still, it is always worth while giving it a trial.

Some cases appeared to improve when small doses (gr. $\frac{1}{2}$) of the extract of thyroid gland were given, but these were not of a very severe type. In the most advanced cases pituitary extract was given in doses commencing with $\frac{1}{4}$ grain, and gradually increasing to a grain. Later on during convalescence some preparation of iron, preferably the saccharated carbonate, should be given. Residence at the seaside also appeared to hasten the healing process, and tended to promote sleep. Sea-bathing also was beneficial, provided the skin was free from the eruption.

One of the most typical and at the same time one of the worst cases I have seen was the child of Mr. W., aged ten months, when brought to my rooms on the 5th July, 1912. The mother said it had been ailing for two weeks, but during the last two days it had been much worse. "Its illness had commenced with gradual loss of appetite, until now it was with the greatest difficulty she could get it to take a drink at all; and the prominent symptom was its inability to sleep, whining and fretful whenever it was disturbed. It had a litte diarrhoea for a day or two, with greenish motions. For the last week she had noticed a lot of spots on its body, and the palms of hands and soles of feet were peeling. The feet and hands had been swollen and red for several days."

The mother stated it was the fourth child; the others were perfectly healthy and strong; it had been born at full time, was reared on the breast entirely and solely, until it got sick, when she tried it with several different kinds of food, but it would not take them. It had had no other illness, except a cold and a little diarrhoea when cutting a tooth at nine months. The mother was well, had not been ailing, had had plenty of milk all along, and had not menstruated since birth of child.

The first thing that caught my eye was the redness and swelling of the hands. The whole hand was of a dull-red colour, with a dash of blue in it—*i.e.*, it was not bright red, nor was it a cyanosed red, but something between the two. The colour disappeared easily on slight pressure, and rapidly returned. It did not extend above the wrist-joint. The swelling did not pit on pressure, and was of uniform distribution, more marked perhaps on the dorsum of the hand. A marked feature in all the cases is the coldness of the affected parts. Between the fingers and on the borders of the palm were a few unbroken vesicles, and several broken ones with ragged raised cuticle, and a fair amount of desquamation in the palm itself. The nails were unaffected, except in the increase of colour. The feet were in a similar condition, the redness and swelling disappearing just above the malleoli. The next point that was most noticeable was the extreme listlessness and flaccidity of the child. It lay on its mother's knees quite flat out, with apparently every muscle relaxed. When disturbed or roused it could use all its muscles, and whined and cried, but no muscle-tenderness could be detected, nor had its mother noticed that movement or handling caused it any pain.

There were three teeth, and one was nearly shed. There was no swelling, redness, nor sponginess of gums. The tongue was slightly furred. No abnormality about the fauces or pharynx. On the trunk, especially on the abdomen, was a small discrete papular miliaria.

The abdominal wall was very flaccid and sunken. Spleen not to be felt. No enlarged glands anywhere in body. The muscles of the extremities were generally wasted, and especially so were the extensors of the thigh and the erector muscles of the spine. The reflexes were easily elicited, but not exaggerated. The urine was scanty, straw-coloured, and contained an excess of phosphates, but no albumen, no pus, no sugar. (The mother said she thought it passed less water than it used to.)

The mother did not think the child had had a sore throat. Swabs taken from the nose and throat were negative.

The child was given 3 grains of chloride of calcium three times a day. Albumen water was given, a little at a time, for a few days, and then a little raw-meat juice. The mother was told to keep it out of doors as much as possible. Improvement was noticed almost at once, but it was very gradual. The wasted muscles were massaged daily, and also the forearm and hands and feet and legs. It was several weeks before the child was well. At the present time there is no evidence of any past trouble, and the mother says she thinks it is the strongest of any of her children.

SECTION OF NAVAL AND MILITARY MEDICINE AND SURGERY.

OPENING REMARKS.

By Colonel T. H. Fiaschi, D.S.O., A.A.M.C.,

P.M.O. for New South Wales.

Brother officers and gentlemen,—It is now various sessions of the Australasian Medical Congress in which we have had a Section of Military Medicine and Surgery, and in all of these we had important papers, exciting very interesting discussions. In this tenth session in Auckland the list of papers before us is somewhat meagre. We may, however, account for it by the fact that during the last three years in Australia officers of the Army Medical Corps have had so much practical work before them that very little time was left to them for thinking or writing anything about it. As you know, we have recently been putting into practice the new Defence Act, through which a large number of young cadets are enlisted yearly into the Militia. The examination and training of these, though so far carried out with most satisfactory results, has somewhat filled up all the vacant time of the officers of the Australian Army Medical Corps; hence the lack of papers from Australia to this Congress.

A couple of burning questions pressing us now are: First, the exact proportion of "fit" that we are able to enlist as trainees. We ought to find out whether this proportion compares favourably with what you would have under the same conditions of age in other countries; also what would be the best means in the domestic training of youths to diminish the number of "unfit." This problem is not only of great importance to the military authorities, but also to the nation and country at large. This strict physical examination of all the young male inhabitants puts to a searching test the soundness, strength, and virility of the rising nation, and the medical officers whose duty it is to go through this work should realize the importance of it. They should not consider it a drudgery, but a most interesting duty—one that puts them in direct contact with some of the most interesting hygienic, dietetic, and educational problems of the present day. I really hope that when this glut of work through which we have gone will be passed, that many of our young and enthusiastic officers will think over these questions, and before next Congress, in Brisbane, will be able to give us some papers that may be able to bring good results.

Second: The other burning question is, What are the tropical diseases that may affect an expeditionary force, say, of ten thousand men, that may at any time be sent to the Northern Territory? You know that the northern third of Australia is tropical, and that it is the part of it most sparsely inhabited, and the one that some Great Power may at any time covet as a suitable place where to direct and settle their surplus population. Now, we know a great deal about the tropical diseases that prevail in the Congo or in the Imperial British East Africa, but know very little indeed of those that exist in that great stretch of continent called the Northern Territory of Australia.

This is a matter that requires immediate attention and study. I am glad to inform you that this subject will take a prominent part in the next Australasian Medical Congress to be held in Brisbane in 1917. Already a sub-committee has been formed, having as Secretary Captain Graham Butler, of the A.A.M.C., and a series of questions have been sent to all medical men, clergymen, and public teachers to find out all about the prevalence or not of the following diseases: Typhoid fever, tropical dysentery, rheumatism, malaria, diarrhœa and enteritis, sprue anchylostomiasis, filariasis, barcoo rot, tinea, beriberi, bilharziosis, climatic bubo, dengue fever, frumboesia, haemoglobinuria, heat-exhaustion, thermic fever, tropical liver-abscess, pillagra, sprue, trachoma kala azar, tropical amnesia, &c. It would be a good thing if even now we could know which of the diseases that are found in certain tropical countries are not present in Australia. We may so far say that sleeping-sickness and yellow fever are not to be found in the Northern Territory of Australia, and am glad to inform you that Captain Graham Butler has very kindly, and at a short notice, consented to address the section on this important subject.

Looking round to other parts of the Empire and of the world, we find that daring and gigantic strides are attempted by military officers so as to bring immediate assistance to the wounded on the field. The aeroplane is now seriously considered by Lieut.-Colonel Donegan and others as a possible rapid means of carrying help to the wounded. On the other hand, we find other men who have studied in the recent campaigns abdominal wounds and injuries to the blood-vessels, are more and more inclined to recognize the surgeon's limitation in affording medical-surgical treatment in such conditions on the field. Notably, Mr. Makins, in his Bradshaw lecture on "Gunshot Injuries of the Arteries," considers that progress in the branch of military surgery concerned with arterial wounds by bullets of small calibre is in the direction of greater conservation and more watchful expectancy.

Though we may be possibly not able to add just now much light on these important questions, it is right to bear them in mind, and I shall be thankful to any gentleman who may help us in any way.

THE TRAINING AND ORGANIZATION OF OUR AMBULANCE UNITS.

By Lieut.-Colonel Clennell Fenwick (Christchurch),

Commanding No. 6 Mounted Field Ambulance.

I offer this paper in the hope that it may provoke a serious discussion among my fellow-officers. I will therefore be as brief as possible in my statements, which I advance with the idea of eliciting the experience of other officers.

I submit the following axioms:—

(1.) That the New Zealand Governments of three successive Ministries would not have sanctioned the enormous annual financial burden of compulsory military training unless it was believed that we may be obliged at some time to defend this country.

(2.) That our branch of the service will have a very important part to play in actual hostilities.

(3.) That, whatever attack we may have to repel, the first brunt of fighting must fall upon our coast-line. The enemy's base must be their transports and whatever coast town they may be able to seize.

(4.) That an enemy whose sole chance of success must depend upon their initial success, which would entail *any* sacrifice on their part being made to secure a footing, could not hamper themselves with *our* wounded as well as their own.

(5.) That our success in repelling attack depends greatly upon the mobility of the defending columns, and that the first duty of the Ambulance units must be to clear our fighting-lines of sick and wounded in order to leave the columns unhampered.

I take the responsibility for making the following statements :—

(1.) Our officers are at present not trained in field-work such as would fall to their share in active service.

(2.) Out of the 151 medical officers on the active list, only thirty-nine are training with the Ambulance units, and forty-two are nominally attached to regiments. Seventy are unattached, the inference being that these officers are not receiving any training at all.

(3.) That the training of the units is not being carried out on practical lines.

(4.) That there is a lamentable waste of excellent material in the shape of medical officers, who would be invaluable if they received exactly the training they would require if there was an immediate prospect of active service.

I put a theoretical case before you. The scene I have chosen from the last staff ride which I had the honour to attend as Senior Medical Officer.

A Brown force has succeeded in landing troops at Timaru. Defending columns are hurried from Dunedin and Christchurch. The only available Ambulance units are No. 6 and No. 3 from Christchurch, and No. 4 and No. 8 from Dunedin. In addition we can draw upon the well-trained men of St. John's Ambulance Corps.

The duties of the units would be to clear the fighting-zone, passing back the sick and disabled towards the next line, which could be formed by field hospital supplied with surgeons from Christchurch, and attended by St. John's bearers and nurses. The final line would be Ashburton and Christchurch Hospitals.

With all respect to my brother-officers, I would ask how many are able, from their training received during recent years, to take charge of the active units. What knowledge have they been taught in their duties as purely military officers? To show how absolutely this military knowledge is, let me suggest an attempt upon an officer untrained in military work to take his unit into action.

The roads round Timaru are good, but few. These *must* be kept clear for the rapid movements of Mounted Infantry, guns, transport, ammunition columns, &c. The untrained officer will probably (and in my actual experience almost certainly) place his field hospital too near the firing-line if he is rash, and at a huge distance from this unpleasant area if he is cautious. His dressing-stations will be huddled together, his rally-point be forgotten or hidden in some inaccessible situation, his bearers and wagons will be sent forward *en masse*, and will naturally stick together like bees. Human nature, untrained, always demands the "touch of the shoulder" in danger. He will cling to the main road under the idea of rapid evacuation, and, personally brave, will risk his men needlessly. The end of the day will either find him tangled up in an operating-tent or riding a lame horse some miles away, under the impression that he is directing his unit.

In contrast to this the trained officer will have spent his day in a very different manner. He has reported the arrival of his unit at headquarters, and has received his operation orders. He has issued his orders to his junior officers and N.C.O.s., each of whom has made a rough map of the fighting-area and fixed his compass-points. He has decided on the position of his field hospitals both for forward and for retreating movements. He has sent a responsible N.C.O. to the nearest railway-siding to beg, cajole, or swindle some trucks out of the overworked R.S.O.

The areas over which each junior is to work have been roughly mapped out. His quartermaster is an accomplished thief. Whatever happens, he finds straw for the wagons, forage for the horses, and food for the men. The local chemist has been visited, and opium and chloroform commandeered. His men have food in their haversacks and boiled water in their bottles. Another N.C.O. has marked stores, halls, or churches for reception of wounded, and has enlisted the non-hysterical portion of the women for help.

The O.C. unit knows he can depend upon the men he has personally trained, and sends them forward with confidence that they will do their work and not spend the day running uselessly about as if they were at a fancy competition. He does not hurry away every wagon and stretcher towards the firing; he cold-bloodedly refuses to believe that an outburst of rifle fire betokens an Armageddon, and he stolidly keeps half his wagons and bearers in reserve. His semaphore-men are stretched out in a fan, and his two signallers are up a tree or on top of a house watching for messages. At the end of the day he knows where his wounded are, how many are moving towards railhead, how many are in the operating-marquee, and how many are able to return to duty.

This is not a fancy picture. I have two splendid examples in mind. Both units were from Colonial Forces, and both could be equalled by a New Zealand unit if properly trained.

If we are to do decent work we should have practical training. At present we are (in theory) being trained on R.A.M.C. lines. The R.A.M.C. have years to spend over their education, our men have forty-five hours drill, twelve half-days (thirty-six hours) and nine days in camp, where they have the honour of attending to the fancied ailments of their brother-Territorials in the combatant branches.

It is evident that under these circumstances our men cannot be trained. To get good units we must reorganize our syllabus.

The absolute essentials of the men are—(1) Good physique; (2) a good knowledge of first aid; (3) ability to read semaphore signals correctly and rapidly; (4) absolute obedience and trust in their N.C.O. and officers.

(1.) I regret to say that the majority of men in the units are of poor physique. How they would get through a day of carrying wounded I do not like to think. We want strong men, not weaklings who enter the corps because they are too conscientious or frightened to go into the fighting-line.

(2.) First aid is absolutely necessary. Practical knowledge can be taught in twelve lessons with constant practice of the most important parts. Stopping haemorrhage, setting fractures, and surgical cleanliness are the points we should teach. It may be important to know how to decide which poison the man has taken, but I am not aware of any statistics showing that fighting-men often poison themselves, except with alcohol and bad water.

(3.) Semaphoring is one of the most important things in field-work. I teach every man this form of signalling, but regret to say that only three badges of efficiency are allowed per unit. This is no encouragement for men to try and become proficient. We want all the men to be proficient, not three successful examination men.

(4.) Obedience and trust in times of strain can only be acquired by the constant training of men *together*.

I respectfully suggest that the seniors in authority should meet and draw up a short syllabus which will teach the men enough in their year's work to render them able to do rough first aid and give them a definite limit to the matters they must know.

The requirements of an N.C.O. are—(1) Good physique; (2) good first-aid knowledge; (3) efficient signalling knowledge; (4) a hold over the men.

Each Ambulance unit *must* have a quartermaster. At present only the Bearer corps are allowed a quartermaster, who holds the rank of Hon. Lieutenant. Why the Mounted corps should not have this official I cannot understand. The Mounted need a quartermaster more than the Bearers. They are always moving, and often have to bivouac at a distance from headquarters, and a trained quartermaster would be invaluable. In addition it gives the chance of promotion which each N.C.O. would have as an inducement to do his work in the lower ranks well.

The officers are *all* well-trained men professionally. They could all perform surgical operations, but few could rightly interpret an operation order from headquarters or write one for their unit. To make our officers efficient they must have field training. I suggest that the O.C. units should be ordered to attend the yearly staff ride. They would thus learn the intricacy of operations, and gain very valuable knowledge in handling their own units.

I regret the waste of good material in the Army List. Why should so many officers be unattached? I think that every officer should be first attached to an Ambulance unit, and gain his practical field-work with these corps. Later he could be posted to a regiment, and train his regimental stretcher-bearers. How many regimental surgeons in New Zealand have been allotted the regulation number of stretcher-bearers?

I lay the following suggestions before you for debate:—

(1.) That a revised simple syllabus be issued for the training of the men—so-many hours first aid, signalling, drill, and field-work.

(2.) That all units should train each month in the field with the local regiment.

(3.) That to ensure a sufficient supply of trained officers *all* officers should on first appointment be posted to Ambulance units.

(4.) That regimental officers should be held responsible that they obtained from the commanding officer the regulation number of regimental stretcher-bearers, and that they trained these men in their duties.

(5.) That O.C. units should be allowed a certain amount of money to provide transport for half-day parades, week-end camps, &c.

(6.) That badges for efficiency in signalling, cooking, nursing, water duties, &c., should be issued to every man who passes each test examination. It may be as stiff as possible.

(7.) That all O.C. units should be allowed or ordered to attend the yearly staff rides.

(8.) To avoid the futile waste of time in the yearly camps, the camp sick should be attended by volunteers from the units, and that these men should be paid 3s. per diem extra. This would be an inducement for the men to become proficient in nursing and first aid.

I have elsewhere suggested that men who are keen on their duties might be allowed to attend the out-patient department of the local hospitals as dressers on half-holidays, and gain a badge (trained hospital orderly) after examination.

THE USE OF SPINAL ANALGESIA ON THE FIELD.

By Colonel T. H. Fiaschi, D.S.O., A.A.M.C.,

P.M.O. for New South Wales.

All those amongst you who have read the admirable articles on spinal analgesia by Major J. W. Haughton, of the R.A.M.C., which have appeared in the B.M.J., in the R.A.M.C.J., in the first volume of Burghard's "Operative Surgery," and in vol. vi of Keen's "Surgery," will not require from me many words to admit that in fully one-half of the cases of wounds and injuries met on the battlefield spinal analgesia is the ideal method. It is too late in the day now to describe this method of anaesthesia, or even to discuss the great advantages of it.

I merely bring this method before you because I had occasion in the last two years in my civil practice to use it in many cases, and can in every point bear out the great advantages claimed for it by Major Haughton. These are: To the patient—(1) increased safety and freedom from the toxaemia of a general anaesthetic, (2) the total abolition of operative shock, (3) the retention of consciousness; to the surgeon—(1) the relaxation of muscular tissue is complete (this degree of relaxation is unattainable by other methods of anaesthesia, and is a great help to rapid operations), (2) the services of an anaesthetist are not required (operations can be carried out single-handed if necessary), (3) the technique and apparatus are simple, portable, and inexpensive.

Though exceedingly simple and easy in itself, if you want to carry it out successfully you require a little practice. For that reason I wish to encourage you to adopt it in your civil practice. You will find it of great advantage there, and if at any time you were called to do duty in war you would be quite familiar with this method, and have no difficulty to carry it out.

Of the various anaesthetic drugs used, Major Haughton prefers the stovaine-glucose solution, and of this he injects 2 c.c. of a 5-per-cent.

solution. I, impressed by what I saw in the practice of various Continental surgeons two years ago, prefer novocain, and inject in adults 2 c.c. of the 5-per-cent. solution in plain sterile water. I never had any bad effect from the drug; and when I hear vague reports of some cases having done badly in this or that hospital I do not believe them, unless proved, which so far have not been.

I think that novocain is the best for military surgeons. Instead of carrying ampoules, which may get old, or break, you carry with you the solid novocain, and it is only a question of careful weighing and of simple sterilization to have a bottle of 5-per-cent. solution prepared which will last safely for a couple of days. I would recommend that the military surgeon should prepare the solution himself, unless he has an intelligent compounder, who, after seeing it prepared carefully a few times, may be able to do so in the future. Novocain solution is very apt to become inactive if it comes in contact with alkalies or iodine, so much so that even the small quantity of iodine that is applied to the skin in Grossich's method of sterilization, by penetrating in the point of the needle,* may at times affect the analgesic effect of the solution. With this drug, with a bottle, a small boiler, and with the spinal anaesthesia syringe sold by Allenbury, you are ready to operate painlessly one-half of the cases of the total number of wounds that occur on the battlefield. You do not require a second medical officer; you merely require an attentive orderly, who will make it his business to watch that on no account the head of the patient is lowered. The only preparation required is to give an enema first, so as to empty the rectum, otherwise there may be involuntary defecation, and if possible to have a light stomach, though it is not absolutely necessary to have a very empty stomach as for inhalation anaesthesia.

The failure of penetrating with the needle in the spinal theca diminishes with the experience gained by the surgeon. Major Haughton in his last six hundred cases did not fail once.†

The chief risk of this method is asphyxia. If you are careful in keeping the patient's head high that will not occur; but if by mischance it did occur, a hypodermic injection of strychnine and immediate artificial respiration will help to restore normal respiration.

ORGANIZATION FOR EVACUATION OF SICK AND WOUNDED.

By Colonel J. R. Purdy, M.B., T.D., H.P.G.,

Director of Medical Services, New Zealand Army.

Evacuation of the sick and wounded is, says Colonel Bruce Skinner, the crux of the medical problem in war. Austria, in the eighteenth century, under Joseph II, first realized the great importance of evacuating the sick and wounded. It was then stated, "The system of evacuating the sick and wounded forms the basis of the entire medical service in the field." The British Army was the last to learn, and profit, from the lessons set by Austria and other nations, and it was not until the twentieth century, and after the Boer War, that the system of removal of sick and wounded became a distinct branch of Staff work in the field.

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* Harry E. Mereness: "Spinal Analgesia in Prison Surgery." *Annals of Surgery*, December, 1913, p. 952.

† "Spinal Anaesthesia in Military Service, with Notes of Six Hundred Cases," by Major J. W. Haughton, R.A.M.C., Brit. Med. Jour., 9th August, 1913.

All the so-called medical scandals of war, says Colonel W. G. MacPherson, have been caused by the failure to recognize evacuation as a concern of Staff officers. The British Army Medical Service has specially suffered.

The attack made by Mr. Burdett Coutts on the medical service at Bloemfontein was to some extent due to the fact that field hospitals were clogged for want of any recognized Staff system of regulating how sick and wounded were to be dealt with under the conditions that arose. In modern war the system for evacuating sick and wounded is divided into three zones—collecting, evacuating, distributing.

All armies have adopted this system. The collecting-zone is the zone in which the sick and wounded are collected and brought to a definite point by the agency of regimental medical arrangements and field medical units. The evacuating-zone commences at the point where the ramifications of the collecting-zone converge, and extends generally down the lines of communication to a sea or home-territory base. The distributing-zone is, in a way, comparable to the collecting-zone, with this difference: that instead of converging to the evacuating-zone it diverges from it, and spreads over the whole of the interior of a country where there are hospitals, convalescent depots, homes, and so on.

The regimental medical service works during an action over a depth extending not more than half a mile behind the fighting-line; generally not farther back than the regimental reserves. Russia has the most elaborately organized regimental medical service. In the Japanese Army the work of removing the wounded to the main dressing-station is done entirely by stretcher-bearers; in Austria by wheeled transport; and in most other armies, partly by bearers partly by transport.

In Manchuria the Japanese ignored artillery fire, as with only bearers they found it impossible to place the dressing-stations farther back than one mile, or even less, from the regimental medical service; they were consequently exposed to severe artillery and rifle fire. When transport is used dressing-stations can be placed farther back.

Stretcher-bearers are not, as a rule, employed in removing wounded from dressing-stations. The clearing-hospital takes over the wounded from the field.

Colonel Bruce Skinner says, "The Japs. in the earlier part of the war had to supplement their organization, as they did not provide the means for evacuation, at least up to the Battle of Liao-yang. It must be borne in mind that their system involved divided control of the machinery, and divided control has always led to inefficiency. Their field hospitals did not get near enough to the scene of action. The bearer battalions carried the wounded from the unit dressing-stations to their own dressing-stations, and from there to the field hospitals, some five miles to the rear. The latter had no transport; the bearers were unequal to the task, and transport from the dressing-station to the field hospital had to be improvised. Further, they had to push up the field hospital within two miles, and sometimes within one mile, of the fighting-line. As a consequence of this lack of transport, the Jap. field hospitals became overloaded up to four times their receiving-capacity."

The Russian arrangements were so admirable for evacuation that the field army was not hampered with sick and wounded, in spite of the enormous numbers of the latter. It was partly owing to the skilful evacuation of the wounded that General Kuropatkin was able to effect his remarkable retreat at Liao-yang.

The commander in war who encourages medical evacuation will be amply repaid by the condition of his troops. Owing to the lessons we have learnt, not only from our own wars but also those of other nations, the organization for evacuation has been greatly simplified. There can be no doubt that in order to make the organization complete the medical service ought to have its own transport. It was the possession of its own transport that made the Australian Medical Corps so prominent in the Boer War. In the British Army, however, it is laid down that the transport must be supplied by the Army Service Corps, and here in New Zealand we follow suit; therefore all we can do in our Dominion is to work in with the Army Service Corps, and see that our arrangements fit in with theirs. This work has been much simplified by the new organization scheme of the Army Service Corps, and no doubt mechanical transport will lessen many of the difficulties that have hitherto confronted them. As it is, our dressing-stations and all our posts on lines of communication are now established close to the Army Service Corps posts. With the fact that it may be inconvenient to remove wounded by means of transport-wagons, we have nothing to do; that is the regulation, and all we have to do is to see that our plans are so formed that they work smoothly and efficiently. In order to understand the organization in its present simplicity—for simplicity is the great feature of our modern organization—let us begin at the front, and work back to the base.

In the collecting-zone there are regimental aid posts, dressing-stations, and also a collecting-station for slightly wounded men.

The Regimental Medical Officer has the following personnel: From N.Z.M.C., one corporal and four men for water duties; from the battalion, one lance-corporal as orderly, one private to drive the Maltese cart, sixteen stretcher-bearers, and one N.C.O. and eight men who form the regimental sanitary detachment. This, you see, makes a very fair command of thirty-two all told.

The duties of the regimental officer vary according to whether when in action his force is defending, attacking, counter-attacking, or retreating. In defence he should establish a regimental aid post as near the trenches as possible; this post should have some rough cover for shelter, and, if possible, be out of the line of trouble from overshots.

No elaborate arrangements for the care and treatment of wounds can be made at an aid station. It often merely becomes a place for assembling wounded.

The stretcher-bearers remain in their companies, but without arms, render first aid, and when occasion offers remove the seriously injured to aid post.

During the height of the attack, when the enemy's Infantry is being vigorously supported by artillery fire, only first aid can be rendered.

The medical officer and his orderly should remain in the trenches during the action, and move up and down the position as much as possible. The morale of troops is much influenced by his presence among them.

In a counter-attack the doctor, with the bearers, follows the advance. The stretchers are left in the trenches. The N.Z.M.C. corporal collects them, and loads them on the Maltese cart.

When there is a lull in the fighting, advantage should be taken to remove the wounded and dead from the trenches; fighting-troops help in this if the O.C. companies permits. The presence of wounded and dead men in trenches is dispiriting to the men.

In Attack.—The aid post is not formed until troops are in action; by this time the stretchers will have come up. When it is formed the officer and his orderly advances with the battalion, renders first aid, and directs the stretcher-bearers.

Regulations state: In action against a civilized enemy no one other than a stretcher-bearer is to carry a wounded man to the rear unless ordered to do so.

The medical officer in the attack should be in the firing-line, not at the aid post. The aid post comes in the zone of the labours of the Bearer Division.

When the action is over, if the battalion is not employed in the pursuit, the cart and stretchers are brought up, and with aid from the battalion the ground over which the battalion fought is searched, and the seriously wounded brought to some place accessible to wagons. While this is being done the Bearer Division is informed where the wounded are being collected. If the battalion goes in pursuit the doctor and bearers and cart must go with it, but if the casualties have been many the N.Z.M.C. men with the water-cart should be left behind.

In an *encounter battle* the medical officer has to suit himself to circumstances, but should accompany the troops with his personnel, and with stretchers and water and Maltese cart if that is possible. If he has to abandon his equipment owing to the nature of the country he should go on, leaving word for the equipment to follow him up as best it may.

The Regimental Medical Officer should have a good supply of morphia and a hypodermic syringe, as a great part of his duty will be the rendering of first aid, relieving pain, and controlling haemorrhage. The first-aid dressing is now considered an essential by all nations, and all the men should be taught how to apply it. The regimental bearers leave the wounded at the aid post, and they are then taken in hand by the Bearer Division from dressing-station.

Dressing-stations in the attack are to be as near the line as the character of the cover in the terrain would permit—somewhere within the danger zone from overshots. They should not be established early in the attack. Dressing-stations are therefore seldom fixed in operation orders, but it might be advantageous to fix the location of one of them in orders.

In a *defensive engagement* locations can be selected in advance. Clearing-hospitals should be as near to the dressing-stations as the military situation and safety permits.

At the station for slightly wounded men there should be one medical officer and eight men. This station also serves for the reception of sick and exhausted. It is specially important this class of patients should be kept away from the clearing-hospitals, as they would be the first to arrive and fill them to overflowing before the severe cases were brought in. No surgical service of any consequence is expected to be performed there.

The place should be within convenient reach of the field of losses, just beyond the danger zone, generally at a point well known to the troops, and on the line of route passed over by them, as slightly wounded men naturally drift back the way they came. It should be a distance from the clearing-hospital.

This station for slightly wounded men is an innovation, but is now adopted by all nations, as it helps in a measure to solve what has hitherto been a source of great trouble—the overcrowding of dressing-stations and clearing-hospitals with slightly injured men, some of whom may be able to go back to the firing-line after very slight attention. No personnel is laid down for this station, but I think one medical officer and eight men would suffice.

In the Boer War in two of the great disasters—Magersfontein and Spionkop—the percentage of casualties was considerably under 10 per cent. of the troops engaged, although the ordinary man in the street believes that the losses were enormous, because one or two companies in the firing-line lost heavily.

From Statistics of Previous Wars.—The maximum casualties in a division of 20,000 men range from 25 to 30 per cent. In the Manchurian campaign 75 per cent. of troops were able to reach help unaided. The unit losses worked out at—

	Russia.	Japan.
Infantry	26·6 per cent.	32 per cent.
Cavalry	9·9 per cent.	2 per cent.
Artillery	8·7 per cent.	14 per cent.

The wounded are in four categories—(1.) Severely wounded: the transportation of such cases to a distance would in all probability deprive many of their chance of recovering. (2.) Less severely wounded, requiring transportation. (3.) Wounded able to walk to dressing-station or clearing-hospital. (4.) Wounded able to walk to station for slightly wounded or to the advance force or other designated point on line of communication.

The ratio works out—20 per cent. killed, 8 per cent. non-transportable, 32 per cent. requiring transportation, 28 per cent. able to walk to dressing-station, 12 per cent. able to walk to collecting-station. Of the 32 per cent. requiring transportation—sitting up, 20 per cent.; recumbent, 12 per cent.

Therefore in every hundred wounded—ten non-transportable, fifteen requiring transport (recumbent), twenty-five requiring transport (sitting), thirty-five able to walk to dressing-station, fifteen able to walk to collecting-station.

If a division sustained a loss of 10 per cent.—and, mark you, we would practically not have more men fighting in New Zealand than a division at one time—there would be killed, 400; wounded, non-transportable, 160; requiring transport, 640—250 recumbent and 390 sitting; able to walk to dressing-station, 560; able to walk to collecting-station, 240: total, 2,000. If 25 per cent.—Killed, 1,000; wounded, non-transportable, 400; requiring transport, 1,600—600 recumbent and 1,000 sitting; able to walk to dressing-station, 1,400; able to walk to collecting-station, 600: total, 5,000.

Thus it will be seen that in New Zealand we have not to face the difficulties of the transport of large numbers of wounded men. In the Franco-German, Russo-Jap., and Balkan wars there were many wounded owing to the large armies engaged, and inadequate transport, so that Zaradovski's plan for tiering the wounded, or modifications therefor (and they are many), had to be adopted. In this Dominion, in the North Island, we could remove all our wounded by means of sleeper-trains in a very short time. There are ten sleepers, each holding twenty men. Allowing for nurses and medical officers, 190 men could be removed in one sleeper-train. If necessary, the sleepers could be added to by utilizing second-class carriages, as in each of these twenty men can be comfortably carried lying down, and easily got at and attended to.

In the South Island, where there are no sleepers, the second-class carriages could be used. We are thus saved the expense of providing ropes, bolts, and all the fit-up necessary to improvise equipment for the removal of wounded men. And there is a further advantage, in this: we are saved the training of men in the improvisation and adaptation of such equipment; and this is a great point, because, owing to the limited amount of training the men can obtain, all our energies have to be devoted to the ordinary routine training as laid down in the syllabus.

The Welsh unit of the British Red Cross Society working in Servia during the late war, reported: Hospital trains were used, made up of goods-wagons fitted with a modification of Zaradovski's apparatus for slinging stretchers, and ordinary passenger-coaches into which improvised beds had been fixed. In the carriages the patients lay on fixed beds. In the wagons the stretchers were slung, and this was supposed to lessen the swaying and jolting of the train. All the patients preferred the fixed beds to the swinging stretchers. The stretchers were slung on wire ropes.

In our Dominion, owing to our small numbers, as I have already pointed out, we are not faced with so many difficult problems as other nations. Our greatest difficulty will be the gap between the dressing-station and the clearing-hospital; once the wounded are at the clearing-hospital our difficulties are at an end, not only because our railway transport will be sufficient without any added equipment, but also because the clearing-hospital will in all probability be a base hospital, and there the wounded could remain until able to go back to their own homes. We have ample personnel to cope with all that could be required of us, even in a major disaster with a loss of 25 per cent., and it behoves us now to devote all our attention to the training of men to adequately fulfil the duties devolving upon them between the firing-line and the field hospital.

With regard to disease, in well-seasoned troops the losses after the first few hard marches may be from 5 to 10 per cent. of the force engaged. In our case the loss would, at a minimum, be at least 10 per cent., but the majority of these cases would have been sent down before the actual fighting began, and thus the transport would be ready for the removal of wounded. In conclusion, I wish to emphasize the importance of the Regimental Medical Officer in war-time; he is just as important as the Ambulance Medical Officer, and should see to it that in his unit his position is well defined, and his personnel well and carefully trained. In some units bandsmen take the place of the company stretcher-bearers, but whatever plan is adopted by the unit commander the unit medical officer should insist upon the personnel being specially trained for the work they will have to do when actual fighting begins.

SECTION OF OPHTHALMOLOGY.

[The subject for discussion was "Operative Procedures for the Relief of Glaucoma." The discussion was opened by Dr. Lockhart Gibson, who at short notice filled a gap caused by the illness of Dr. Gault. Dr. Gault's paper was read by proxy.]

THE OPERATIVE TREATMENT OF GLAUCOMA.

By J. Lockhart Gibson, M.D. (Edin.), M.R.C.S. (Eng.), of Brisbane.

When asked in the first place to open this discussion I objected. I did not think myself a good selection, because I had not become a convert to the newer operations for glaucoma. I suggested Dr. Gault because he had told me that his personal experience of the newer operations had been satisfactory. Dr. Gault agreed and has sent his paper, but at the last moment he found himself unable to attend. Upon being again appealed to I felt myself obliged to do my best. I must ask your indulgence, both because of the limited time I have had and for the fact that my paper will hardly fulfil the conditions which might be expected from the title given to the discussion.

It has occurred to me, however, that as there are likely to be more of the section who will uphold the attitude opposite to that I favour, my own remarks may be of some value in supporting what may be called the "previous question," and may for that reason excite discussion.

I am not anxious to be thought too conservative and too little inclined to adopt new views and operative procedures; but I confess to the possession of a, of late, rather rare quality—viz., loyalty. It is a quality that is dying out in other departments of life. In medicine and surgery those of us who have had reason to gain confidence in certain opinions and certain procedures should not be too ready to throw aside old friends for somewhat problematical new ones. Those of us who hold decided opinions have a variety of names applied to us. If a man had taken the trouble and thought to establish his conclusions on fairly clear premises, he would be at least unwise if he changed them too readily.

In this discussion we have to consider the operative treatment of glaucoma from several standpoints—physiological, pathological, clinical, and practical. First, do we favour the filtration theory of intra-ocular tension, or do we favour the secretory theory? Secondly, is our object in operating directed to influence faulty filtration by diminishing the inflow or increasing the outflow, or is it directed to influence faulty secretion by reducing excessive activity of the secretory structures in the eye? Thirdly, are we of opinion that acute glaucoma and chronic glaucoma are capable of the same causal explanation—*i.e.*, are they the same disease differing only in intensity, or are they two different diseases, each leading to the same result?

Those who consider that intra-ocular tension depends entirely on filtration, and not upon any vital secretive properties in any part of the vascular pigmental coat of the eye, will readily favour, for chronic glaucoma at least, any operation which may ensure them a filtering cicatrix—in other words, a permanent exhaust or safety valve against increased intra-ocular tension; whereas those who hold to the view originally brought forward by Von Graefe, supported by Donders, and revived and supported very ably from a physiological standpoint by Leonard Hill—" that the eye by its inherited vital power controls the intra-ocular pressure and circulation; that the cells act in a vital manner, not by mechanical means, such as filtration, at all "—would be less ready to conclude that our chief aim and object in operating in a case of glaucoma is to obtain such an exhaust, such a permanent filtering cicatrix. Although all who favour a secretory explanation of intra-ocular tension would not admit that it is *always* undesirable to establish a filtering cicatrix or permanent extra outflow, our attitude will depend on a conscious or an unconscious bias towards a filtration mechanism, or to a secretory controlling mechanism. It appears to me, indeed, that if we strongly favour the latter we will be apt to disfavour, as a rule, at least the establishment of permanent extra filtration, because of the danger of permanently lowering the intra-ocular tension below what is physiological, or of the danger of making necessary a permanent excessive activity of the secretory cells in order to prevent an unphysiologically low intra-ocular tension.

I take it that as the blood-pressure rises more blood comes into the eyeball. The ciliary processes would be thus expected to secrete more actively because of their increased supply of blood. Their increased activity would increase the intra-ocular pressure still further, and this increased pressure would in time obstruct the blood-flow, and would by this, under *normal* conditions, control the excessive activity of the ciliary processes themselves by diminishing their blood-supply. Still, we have to remember that increased intra-ocular pressure would more easily obstruct the venous outflow than the arterial inflow. The outflowing channel least likely to be affected harmfully by increased intra-ocular pressure is fortunately the canal of Schlemm, embedded as it is in dense sclero-corneal connective tissue, by which it is supported. The portion of the arterial blood-supply to the ciliary processes least likely to be obstructed by increased intra-ocular pressure is that which comes from the anterior ciliary arteries, and from these arteries the ciliary processes might be expected to receive a blood-supply for secretory purposes after their other blood-supply had been obstructed by pressure.

Professor Leonard Hill and Mr. Flack maintain, to use their own words, that " glaucoma is due to some nutritive error in the eye secondary to degenerative changes which interfere with the circulation; or otherwise caused. The essential point, therefore, of an operation is," they say, " not to relieve intra-ocular pressure, but to produce an adequate flow of tissue lymph, and so relieve the nutritional error."

It may be a little difficult to quite grasp what Leonard Hill means by " an adequate flow of tissue lymph." But glaucoma, to my mind, is due to excessive secretory activity of the ciliary processes. This excessive activity may be induced by mechanical irritation or by the action of toxins (using the term " toxin " in its widest sense, to include chemical and other irritants circulating in the blood). I have even had the impression that the large intestine is accountable for at least some of the cases, as it is, in my opinion, answerable for some of the cases of hyperthyroidism. This belief long ago led me to treat, apparently with benefit, cases suffering from excessive secretion of thyroid juice with intestinal antiseptics, and I have endeavoured to gain help from sour milk and from salol in cases of glaucoma. We may find that Fischer's suggestion to counteract acidity and so influence oedema may be useful.

Given a state of increased secretory activity of the ciliary processes, the intra-ocular tension increases, the entrance of blood into the eye is in turn decreased, but without lowering sufficiently the increased activity of the ciliary body. The nervous vascular and other coats of the eye are subjected to excessive pressure from within. The aqueous gets readily out of the canal of Schlemm. The iris is pressed forward, and the anterior chamber becomes shallow. No doubt the iris may at the same time hinder access of the aqueous to the canal of Schlemm. It has always been a mystery to me why the belief is so widespread that faulty emptying of the anterior chamber is a cause of acute glaucoma. If it were, the anterior chamber would be at least as deep as usual, and not nearly abolished. The increased intra-ocular pressure is harmful to the retina. It paralyses the sphincter of the iris, and it causes the cornea to become insensitive and also opaque, the latter by stretching and by cutting off its blood-supply.

If the explanation I favour be correct, the endeavour to cure glaucoma (I speak more especially of acute glaucoma) by a permanent corneo-scleral filtering cicatrix is unscientific. It is treating a symptom, and treating that in a roundabout manner. The classical operation of Graefe will, I believe, regain its hold on ophthalmologists. It will, I believe, again become the only operation, where operation is required, for acute glaucoma. A peripheral iridectomy without the establishment of a filtering cicatrix gets rid of the glaucomatous state, and, if the disease has not gone too far, cures the patient, and may cure to all intents and purposes permanently. It may cure by making the canal of Schlemm at the site of the coloboma more accessible to the aqueous; and to me this is an alternative explanation to that I hold, but only a partial one. Some points in two or three cases observed by me for many years will, I think, support my contention.

A peripheral iridectomy appears to exert a profound influence on the secretory excitability of the ciliary processes. I have seen it do this in a case of acute glaucoma set up by a swollen cataractous lens, where the incision healed without becoming a filtering cicatrix, the chemosed and injected eyeball settled down. The cornea became clear and sensitive. The intra-ocular tension returned to and remained at normal, but the very swollen though unruptured lens still kept the iris pushed forward and the anterior chamber so shallow as to introduce considerable difficulty in making the incision for extraction of the cataract some weeks later. In this case the greatly swollen lens caused glaucoma, I believe, not by blocking the angle of filtration, but by directly irritating the ciliary processes to excessive secretion of aqueous fluid. And this secretion was in excess of the outflow, even if all the normal channels of outflow remained open. Upon removal of the lens the anterior chamber regained within a few days a normal depth. But the partially paralysed sphincter did not recover. The cataract incision also healed without showing any signs of being a filtering cicatrix. In this case, had the cause of the glaucomatous attack been the swollen lens pressing the base of the iris into the filtration angle and blocking it, my iridectomy would not have brought the intra-ocular tension back to normal and kept it there, because the iris had remained as it was, except, of course, where the coloboma existed. The anterior chamber became only slightly less shallow, and there was no sign that the cicatrix was filtering. It may, indeed, have been that the better access of the aqueous fluid to the canal of Schlemm at the coloboma was the real cause of the normal tension. If so, a peripheral iridectomy did the deed.

Those oculists, Elliott in particular, who are claiming that the establishment of a permanent filtering cicatrix will be the future treatment for *acute* glaucoma, surely forget that the establishment of such would result in an intra-ocular tension below normal, and that a normal tension must be more physiological, and therefore better for the nervous and vascular coats of the eye; that therefore a result obtained with the re-establishment of a normal tension would be more likely to be permanent. I say this although I am quite satisfied that the normal intra-ocular tension varies within very wide limits, and that it does so vary especially in some eyes below what one is accustomed to consider a normal tension.

When we come to chronic glaucoma the case is more difficult, and the case of the establishment of a filtering cicatrix has greater support. I have acquired the opinion, which I mentioned indeed at the Melbourne Congress, that a deep anterior chamber in a case of glaucoma is a very bad sign—that I expected little benefit from an iridectomy operation in such a case. It is the fact that such cases exist which has caused me to read with interest, not without hope, the case for a filtering cicatrix advanced by Lagrange, Fergus, Herbert, and Elliott. Although, however, one notes here and there mention of a deep anterior chamber, the cases have generally a shallow chamber, and chronic glaucoma as described in recent work is merely a milder and more chronic form of acute glaucoma. If it is such—and I favour that view—we have, I believe, to rely in the first place and chiefly on hygienic, constitutional, and nutritive treatment, including, of course, intestinal disinfection and oral and other asepsis, and perhaps a counteraction of acidity by the internal or subjunctional administration of citrate of soda as suggested by Fischer.

If it is to be treated by operation on the eye I must admit that I am still not a convert to a filtering cicatrix, and that I would favour not only an iridectomy, but an iridectomy followed by a neatly healed wound. Lagrange, who may be taken as the pioneer, in recent work, of a filtering cicatrix, does not advocate it for acute glaucoma. He is so satisfied, however, that it is *the* treatment for chronic that he endeavours at times to secure the effect he wishes without performing an iridectomy. The other operations, including sclero-corneal trephining, which last has been brought so prominently before us by the genius, personality, and advocacy of Elliott, include an iridectomy, and it appears to me that the iridectomy is one which can in no way compare with an iridectomy obtained by means of an incision with a keratome or a Graefe's knife.

It has been customary, I know, to endeavour to obtain a large iridectomy when operating for glaucoma. That has not been my practice, so much as to obtain a very peripheral one. I have been accustomed to use a keratome because I think the incision obtained can be more peripheral than with a Graefe. An endeavour is made to enter the angle of the anterior chamber, really through scleral tissue, by passing the point vertically to its surface until it enters the chamber, and then turning it well forward. I have never tried to obtain a filtering cicatrix, although, since Dr. Odillo Maher's description of his method of operating in chronic glaucoma, given at the Melbourne Congress, I have been less anxious to avoid inclusion of the iris in the wound.

I have not seen many cases of buphthalmos, congenital glaucoma, but those I have seen lead me to form the opinion that an operative masterly inactivity is the best treatment—a reliance on nature and on eserine or on pilocarpine. Some of them improve and keep a measure of useful sight. They have all had deep anterior chambers.

If the establishment of a sclero-corneal filtering cicatrix is the best treatment for chronic glaucoma, I am sure it would be better treatment for buphthalmos than iridectomy, provided that high tension existed.

It must be admitted that favourable reports are accumulating of the results of the production of a filtering cicatrix, and that they are in a measure convincing. Still, very few cases have been observed for a long enough time to convince us that, if the filtering cicatrix is permanent, it is not a disadvantage to the eye. It must often be a very uncomfortable foreign body under the lid. I have already tried to advance some support for my attitude from a case of glaucoma set up by a swollen cataractous lens. I am no great believer in statistics in such matters, but think much may be learnt from a study of individual cases. I will quote shortly the lessons capable of being learnt from two or three cases.

Mrs. S., of whom I have notes from 1892, and news of last month, demonstrates for one eye the value and permanence of iridectomy in chronic glaucoma, and for the other eye demonstrates not only the value of iridectomy in subacute glaucoma, but also apparently that the toxins of dengue circulating in the blood may induce in a susceptible patient an attack of glaucoma; while the other, which had been operated on successfully five years before for chronic glaucoma, was protected by its iridectomy from the poison of dengue which had induced the attack in the second eye.

Aged fifty-three years—October, 1892. Dimness of sight in R.E. for nine or ten months. Slight pain in and around the eye when it is used. Tension + marked, deep glaucomatous cup. Fields very contracted. Sees $\frac{6}{12}$. L.E., normal field and tension. A physiological cup. Eserine used for a month; fields and vision did not improve. Iridectomy done, peripheral. A little inclusion of iris at one corner, and slight cystoid scar there. Tension became normal. Vision, $\frac{6}{9}$ and $\frac{6}{6}$ partly. Fields much better, though still a little contracted. Refraction practically emmetropic. Seen again January, 1898. Contracted dengue on a visit to Brisbane during an epidemic. Came to see me because left eye had become suddenly nearly blind. Found temperature 101·5° F., and a typical dengue eruption. Some pain in left eye and over eyebrow; not enough to keep her awake. Eye injected, cornea hazy, pupil mediumly dilated and inactive. Anterior chamber shallow. Tension, N + 2 as compared with R.E., which had been operated on over five years before. L.E. counted figures at 2 ft. only. Treated with salicylates internally and eserine locally. Temperature normal in three days. On fifth day counted figures at 2 yards. Tension N + 1; pupil inactive, large, and misshapen. Did peripheral iridectomy on fifth day; not a large one. Cicatrix did not become cystoid or filtering. Tension became normal, and remained so. Disc was found to be cupped. Vision came up to $\frac{6}{6}$ and $\frac{6}{5}$ partly. Fields became practically normal. R.E. still seeing $\frac{6}{9}$ and $\frac{6}{6}$ partly.

Mrs. S. is still alive. I was able to get news of her this year—1914—twenty-two years after first operation and seventeen years after the second. Sight quite as good as when I saw her last. Reads and uses her eyes as much as she wants to. Is now seventy-five years of age.

Mrs. K. demonstrates the value of iridectomy in an acute attack of glaucoma of three weeks' standing, possibly induced by influenza and partly by astigmatism; also that the effect was obtained without any filtering cicatrix, and in spite of the fact that the tension had been so high as to lead to permanent and absolute paralysis of the sphincter irides and widely dilated pupils. The base of the iris might be supposed by many to obstruct the flow of aqueous and the canal of Schlemm except at the site of the iridectomy.

Mrs. T. J. K., aged forty-one years. Seen September, 1904. Had come from North Queensland. Eyes troubling for three weeks. When she went to bed three weeks ago, experienced pains in the body and legs. Next morning left eye almost blind, and she had great pain in and around the eye. Two days later the right eye behaved in the same way, also with great pain in and around the eye. Cannot, she says, see with either eye now, "not even light from darkness." Could see light three days ago; four days ago could see a candle. Pupils were widely dilated. Irides atrophic looking, anterior chambers shallow. Eyes deeply injected, upper parts of cornea hazy. Tension at least N + 2. Never sore eyes before, and good sight. Has always suffered much from headache. Left eye no perception of light. R.E. can trace light of ophthalmoscopic mirror even on nasal side—*i.e.*, more than she had led me to expect. Media too hazy for any view of fundus of either. Eserine caused increase of pain and no contraction of pupil in either. Morphia $\frac{1}{6}$ gr. given at once, followed in an hour and a half by iridectomy in each, under ether. On withdrawing keratome the fluid spurted out like a small fountain from left, and only with less force from right eye. Iridectomies were not very large, but very peripheral. Sight in right eye improved from the start. Counted fingers on the fourth day. The left eye had then no P. L. Still even the left ultimately obtained some sight. Its best was fingers in temporal field at 2 yards. The tension in each became normal, and kept normal. Sight in right fluctuated, but improved and ultimately became $\frac{6}{9}$ and $\frac{6}{6}$ partly with a really good field. Neither cicatrix was cystoid, and neither iris was included in the cicatrix. Each pupil remained fully dilated with an atrophic sphincter. The cupping of the left disc was very deep; that of right disc distinct, but much less deep. She required correction for R.E. − 0·50 dsp. − 1·250 cyl. axis vert. My last note of her is in

April, 1913, practically nine years after operation. Vision of R. with correction $\frac{6}{9}$ and $\frac{6}{6}$; good field. Cicatrix as above. Tension perfect. Jaeger 1 at good range with her presbyopic correction. Eyes give her no trouble, and she sews and reads. Never now sees a halo around the light. Does not get headaches. Probably headaches prior to glaucoma attack were due to uncorrected hypermetropic astigmatism, which had been converted into myopic astigmatism by the attack.

The operation was identical in the two eyes in appearance and tension, and in results other than sight. The better sight in the right eye was due to the fact that the left was further gone when operated on. Its attack had begun two days before that in the right. She had travelled nearly one thousand miles to reach Brisbane. She herself had the opinion that influenza caused the attack. I cannot vouch for this, but can believe it. She had almost certainly sufficient hypermetropic astigmatism to prove an exciting cause. She was forty-one years old.

The paralysed iris was not drawn away from the angle of the anterior chamber. The beneficial effect of a peripheral iridectomy and the correction with glasses some weeks after the operation are, in my opinion, the reasons for her freedom from further trouble. Both dengue and influenza are prevalent where she lives. We cannot, therefore, assume that she has not suffered from these since operation.

H. G., aged fifty-seven years. Chronic glaucoma for two or three years, with an acute attack lasting eighteen hours three weeks before I saw him first, in 1897. Peripheral iridectomy. Sight obtained $\frac{6}{9}$. Tension normal. Cicatrix neither filtering nor cystoid. He kept his sight, used his eye as much as he wished, and died only about a year ago. His other eye had been seriously injured by accident years before glaucoma attacked the sound eye. The cause was probably hypermetropic astigmatism.

It is impossible to talk of glaucoma at present without mentioning Schiotz tonometer. It appears to me that a very praiseworthy desire for scientific accuracy is carrying observers away with regard to the use of this instrument in glaucoma. There is a danger of forgetting that our chief aim and object is to give the patient sight or to retain it for him. It cannot be doubted that any drug which even temporarily lowers the vitality of the cornea by paralysing its sensibility must be attended with danger in a case where the cornea has already had its vitality lowered by the disease itself. For this reason alone we should, I think, trust to our *tactus eruditus* in glaucoma.

In any case, normal eyes of different people vary with regard to their intra-ocular tension through such wide limits that a tonometer is useful only to compare the tension in the same eye before and after interference. The results of most surgical interference can be truly estimated only after a period of years. It will be many years before we can speak with any certainty regarding the place a permanent filtering cicatrix has in chronic glaucoma. It appears to me that it will have no place for acute glaucoma, and that it will always have a place in cases with a deep anterior chamber. We have to endeavour to treat a disease, and not only its symptoms. Increased intra-ocular tension is a symptom, although it is the symptom which causes both the pain and the blindness. The establishment of a filtering cicatrix treats this symptom only, whereas a peripheral iridectomy is, I believe, an attempt to influence the disease by modifying the secretory activity of the ciliary processes. We have, however, to strive to avoid operation by removing if possible the cause of increased intra-ocular tension. If, as Fischer argues, the exciting cause is a chemical irritant of an acid nature, the use of citrate of soda may serve us well. I am inclined to test its efficacy by giving it in large internal doses until the urine becomes alkaline. Subconjunctival injections can only be given by a medical man. Internal doses can be taken at any time, if the eye feels in any way uncomfortable.

THE OPERATIVE TREATMENT OF GLAUCOMA.

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The operative treatment of glaucoma dates from the middle of the nineteenth century. In the fourth edition of Mackenzie's "Diseases of the Eye)" (1854) (1) the author recommends puncture of the tunics of the eye behind the lens and the evacuation of some of the vitreous. He believed that some of the symptoms of the disease were due to increase in the quantity and abnormal fluidity of the vitreous, and rightly observed that after puncture the vision of the eye was often improved, at any rate for a time.

It was in 1856, however, that Von Graefe(2) first advocated iridectomy as a cure for glaucoma. The weight of his authority, and the excellent results following the operation, led to its speedy adoption by oculists everywhere. Till the last seven years it has been regarded as the most trustworthy, and the only hopeful treatment for glaucoma.

The general consensus of opinion among oculists ranks it high as a curative measure in cases of acute glaucoma, and of great value also in subacute cases. Were these the only cases to be dealt with, it is probable that little need would have been felt to seek further for a trustworthy remedy.

Very soon, however, after iridectomy was introduced and had been applied to cases of chronic glaucoma, it was found that a considerable percentage received no benefit, either in the direction of durable reduction of tension or of lasting stability of visual acuity or extent of visual fields.

In 1867 De Wecker declared his conviction that the beneficial results following Graefe's operation were to be attributed not to the iridectomy, but to the formation in the neighbourhood of the angle of the anterior chamber of a "filtering scar." Though not the originator of sclerotomy, he succeeded in popularizing the operation and establishing its claim as a valuable procedure, especially in cases which had not been benefited by iridectomy. As it can be repeated again and again in obstinate cases, it has been found a valuable means of postponing the final fall of the curtain.

It is hardly necessary to refer to the operation of Hancock, who divided the ciliary muscles by a short sagittal incision made in the ciliary regions with a Beer's knife—an operation which never obtained general acceptance, nor to the passing vogue of operations upon the cervical sympathetic, which were first advocated by Abadie and Jonnesco in 1987, and were performed for some years afterwards. For a time very favourable results were attributed to this procedure, and as late as the Lisbon Congress of 1906 Jonnesco claimed that the operation was to be preferred before iridectomy for subacute and chronic glaucoma. This method of treatment never came into general use, and the scanty references to it in current literature would lead one to believe that the hopes at first raised have not been sustained.

In a biographical notice of De Wecker published in the *Archives d'Ophthalmologie*, January, 1906,(3) Abadie remarks, "The idea of obtaining a filtering scar, a veritable safety-valve, which would permit a freer discharge of the intra-ocular fluids whenever they are augmented by hypersecretion, still remains a fertile conception which has not yet been realized in practice, but which deserves to be pursued. Perhaps some day it may supply the means of curing by surgery simple chronic glaucoma." In these words Abadie clearly indicated the lines along which ophthalmic surgeons were looking for a way out of their difficulties.

Already many years ago (1881) Bader had endeavoured to create such a permanent outlet by allowing portions of the iris to remain impacted in the wound, and thus obtaining a cystoid cicatrix. In 1903 Herbert published a paper in the *Ophthalmic Review*(4) describing a method of obtaining a fistulous opening into the anterior chamber by pushing a conjunctival flap between the lips of his iridectomy wound. This method, however, gave no security against infection of the eye, and was soon abandoned by its author in place of other ingenious devices.

It is Lagrange, of Bordeaux, to whom must be ascribed the credit of having introduced a method of producing a subconjunctival fistula communicating with the anterior chamber. His first paper on the subject was read before the French Surgical Association in 1905, and subsequently he published a clear account of his operation of combined sclerectomy and iridectomy in the *Archives d'Ophthalmologie*, 1906(5), with cases illustrating its beneficial results. His first operation was performed in February, 1902. As the method of Lagrange has attracted less attention in English-speaking communities than the methods of Herbert and of Elliott, I shall quote the very succinct account of it given in the article referred to: "I first make," says Lagrange, "an incision through the sclerotic, passing as nearly as possible through the ciliary angle. In the last part of the section the knife undergoes a slight rotary movement, so as to turn its cutting-edge a little farther backwards, with the result that the sclerotic is cut obliquely (*en bec de flute*). When the knife becomes free under the conjunctiva it is turned still more sharply backwards, so as to form a large mucous flap in cutting out. Then follows the resection of a portion of the tongue of sclerotic adhering to the cornea. To do this the conjunctiva flap is raised by a fine pair of fixation forceps, the anterior lip of the wound projects, and with a pair of fine-pointed and well-curved scissors a narrow strip of sclerotic is cut off. A large iridectomy is then made."

By this measure Lagrange claimed that he was able to produce a truly filtering scar, in proof of which he pointed to the condition of permanent subconjunctival oedema at the site of his sclerectomy, and oedema in many cases increased by massage of the eye.

In the following year he published details of twenty eyes operated on by this method(6). In the twenty eyes the vision of twelve was notably augmented, and of eight was maintained undiminished. Several had been watched for periods of from two to two and a half years. These early results of Lagrange have been confirmed by the subsequent experience of himself and many others, and it may now be stated confidently that the method of sclerectomy provides the surgeon with a safe and certain means for producing a fistulous communication between the anterior chamber and the subconjunctival tissues.

In his later papers Lagrange has endeavoured to formulate rules to guide the surgeon when dealing with various types of glaucoma. He does not now regard iridectomy as an essential part of the operation, but merely as a measure to prevent incarceration of the iris in the sclerectomy wound. He summarized his rules as follows(7) :—

(*a.*) Cases with intermittent rises of tension or with tension very little above normal—simple sclerectomy. Iridectomy should also be avoided if possible (1) in cases where the field of vision approaches the point of fixation ; (2) in cases of haemorrhagic glaucoma ; (3) in very nervous subjects who are liable to forms of inhibition of the visual apparatus.

(*b.*) Cases with persistent rise of tension of plus 1 or more, in which there is a strong tendency to prolapse of iris—sclerectomy either with a peripheral button-hole or complete iridectomy.

Since Lagrange's important and path-finding work, various methods of performing sclerectomy have been advocated by different operators. A piece has been excised from the posterior lip of the wound (Dor and Jacqueau). Punch forceps have been substituted for the scissors of Lagrange. Cyclodialysis has been added to sclerectomy (Freeland Fergus), with the purpose of opening a communication between the anterior and posterior chambers ; and, lastly, the trephine has been employed by Freeland Fergus, and on a very much larger scale by Elliott, of Madras, and his numerous followers in England and elsewhere.

In 1909 Major Elliott first used the trephine to effect sclerectomy ; and, availing himself of the large amount of material provided in southern India, he was been able to demonstrate the great value of sclerectomy, and has popularized his method of operating throughout the English-speaking world. He has studied his results carefully with the help of notes made in a very thorough and complete schedule, and has gradually perfected and standardized his technique. In connection with his operation, Elliott lays stress on the following points : (1.) As near an approach to asepsis as can be obtained, so as to avoid the closure of the trephine opening by secondary inflammation. (2.) A large upward conjunctival flap semi-lunar in shape, and terminating laterally some millimetres from the cornea, so as to permit diffusion of the fluids escaping through the trephine opening. (3.) Splitting of the cornea, so that the trephine opening may be made as far forward as possible, and engage the cornea for at least half of the diameter of the opening.

For purposes of discussion I think it is desirable that the subject should be dealt with from the following standpoints :—

(1.) Are the newer operations of sclerectomy curative, and will they entirely supersede the classical methods of Graefe ?

(2.) Of the various procedures advocated, which deserves to be chosen as the most generally applicable ?

Addressing myself to the first inquiry, I should like to utter a word of caution. Let us never forget, in our enthusiasm for the new, the value of the old. Graefe's iridectomy is undoubtedly curative in a certain number of cases of chronic glaucoma. Schmidt Rimpler, in the article "Glaucoma" in Graefe-Saemisch's Handbuch, 2nd ed., quotes the following figures, which will establish this statement :—

Hirschberg, reviewing the results of iridectomy in 168 cases of chronic glaucoma which he had observed over periods of from one to eighteen years, found 34 cured, 34 benefited ; no lasting benefit, 41 ; unimproved, 54 (of these 37 were absolute glaucoma and five malignant glaucoma), giving 20 per cent. cured, 20 per cent. benefited for the limited time under which observation was possible ; probably 30 per cent. cured.

Haab (1865–95) : Cases of glaucoma simplex observed over period of two years—Blind, 22 ; relatively cured, 22 ; completely cured, 32 ; total 76—a 42-percentage of cures. In chronic inflammatory glaucoma, cures 33 per cent.

Mellinger, of Basle : Chronic inflammatory glaucoma—Improved, 39 per cent. ; arrested, 14 per cent. ; deteriorated, 47 per cent. Glaucoma simplex—Arrested, 25 per cent. ; deteriorated, 75 per cent.

These figures place the percentage of cures in chronic inflammatory and simple glaucoma as between 20 and 30 per cent., which I think are fairly conservative figures.

It is true that in opposition to these statements Logetschnikoff, of Moscow, reviewing the immense material before him, makes the following pessimistic statements : "Finally, my observation during many years of a large number of cases of glaucoma on which this or that operation has been performed has brought me to the conviction that operation may indeed stop the glaucomatous process for a longer or shorter time, but cannot possibly cure." The only exceptions he makes are cases of acute glaucoma and a few cases of chronic glaucoma operated on very early, before any permanent alterations of structure had been induced by the glaucomatous process(9).

At best, however, these results leave much to be desired, and call for further measures of relief when iridectomy fails.

Is there satisfactory evidence that sclerectomy will produce lasting reduction of intra-ocular tension ? Perusal of Lagrange's papers and study of his illustrations will, I think, convince the most sceptical of the possibility of this achievement. I have myself recently seen two cases operated on by me after Lagrange's method sixteen months and a year ago, in which the evidence of subconjunctival drainage was most convincing, and others operated on more recently give the same evidence. Elliott is quoted by G. F. C. Wallis in the *Ophthalmoscope* (October, 1913) as claiming that after trephining he failed to secure permanently normal tension in only 4·6 per cent. of his cases.

The carefully compiled statistics of Moorfields give a percentage of failure of 15·3(10).

It is true that the short period during which the cases have been under review makes it premature to argue strongly from such statistics, but the results achieved are very encouraging, and appear to show that a valuable auxiliary means at least has been put at the disposal of the oculist, who may still set a high value on iridectomy. Granting that effective drainage of the anterior chamber is the chief desideratum in the treatment of chronic glaucoma, it is much that we can now confidently promise it to our patients. Believing as I do that the practical problem in glaucoma is the problem of hypertension, I welcome with enthusiasm the discovery that a permanent drain through the envelope of the eye can now be established. At the same time, I am not disposed to utterly discard iridectomy—a tried friend. My practice is to combine sclerectomy with iridectomy, so as to obtain the benefits of both operations. It may be that the sclerectomy opening may not prove sufficient of itself to secure permanent normal tension, or that in process of time the opening may become more or less completely blocked. Sclerectomy, therefore, in my opinion, should be regarded for the present as a supplementary and not an exclusive method of treatment.

(2.) Turning now to the second inquiry, and limiting myself to the consideration of Lagrange's sclerectomy and Elliott's trephining, I am disposed to favour the former procedure: (*a*) The technique is extremely simple, and has required practically no modification since it was first laid down by its inventor; (*b*) it enables the full advantages of a broad and peripheral iridectomy to be obtained by the patient; (*c*) it seems to me to offer the best chance of obtaining a fistulous communication between the anterior chamber and the subconjunctival tissues, for the incision in the sclera is so broad that healing along its whole length is extremely unlikely to occur while the channel of exit is placed where it should be, at the angle of the anterior chamber; (*d*) it does not appear to be liable to several of the drawbacks which beset Elliott's operation, to which reference will presently be made.

Elliott has very well put the advantages of trephining in his article "On the Technique of Trephining "(11) in the *Ophthalmoscope* (October, 1913). He claims that the circular opening with the trephine causes the minimum damage to the tunics of the eye consistent with securing a sufficient opening for drainage. He adds, "In the interests of scientific accuracy of methods, we should be able to determine in advance the exact size of the sclerostomy we intend to perform, and to give mathematical effect to such a determination when the time comes to translate it into operative action. This can certainly be done with the trephine. The trephine leaves a clean-cut straight-walled canal of the desired size, of uniform calibre throughout, and running perpendicular to both surfaces of the ocular tunic. Can the same be said of the channel made by any other method of performing sclerotomy?"

I should like to state my objections to trephining, as follows:—

1. The opening recommended is so small that a proper iridectomy cannot be performed through it, and the advantages of that procedure are lost.

2. The opening is so small that it is liable to be occluded in various ways, as Elliott himself has indicated, and as has been proved by anatomical examination of eyes excised in cases of failure(12). Such a blockage may occur from dislocation of the lens or vitreous towards the trephine hole. Prolapse of uveal tissue or filling of the hole by proliferating connective tissue.

3. Elliott has found a tendency to frequent occurrence of post-operative quiet iritis requiring the early use of atropine, which if un-

recognized may cause seclusio pupillae. This complication is certainly not one that vexes the soul of the iridectomist.

4. Elliott's operation appears to depend for its success on the meticulous observation of a considerable number of details, and its technique is subjected to frequent emendation by its author and his disciples.

5. While, generally speaking, a very safe and easy operation to perform, it is attended with certain special risks, such as the falling of the trephined disc into the anterior chamber, from which it is very difficult to extract it, and where it may cause serious inflammatory trouble.

I cannot refrain from expressing admiration of the enthusiasm with which Elliott has pursued his investigations into the subject of sclerectomy—of the open mind he brings to the consideration of all questions relating thereto, and of the evident love of truth and generous recognition of the work of others which characterizes his studies. His operation is a proved success ; it can be repeated again and again if at first it fails to reduce tension, and it certainly accomplishes the end aimed at with the least possible interference with the structures of the eye.

To sum up, my position at present is this :—

1. I regard sclerotomy at the angle of the anterior chamber, accompanied with a peripheral iridectomy, as a measure of proved value in all forms of primary glaucoma, and should be unwilling to abandon it.

2. I welcome the operation of sclerectomy as the realization of a long-sought means of establishing a safe and permanent drain from the anterior chamber.

3. I think the evidence already available sufficient to justify the hope that in this procedure we have at last found a cure for the one really menacing symptom of glaucoma—namely, hypertension.

4. For the present I prefer the method of Lagrange, because it seems to me the simplest and surest way of obtaining a filtering scar, and because it permits one to retain the full advantages of the older operation.

REFERENCES.

(1.) Mackenzie, "Diseases of the Eye," edit. iv., p. 899.
(2.) Graefe on Iridectomy.
(3.) Archives d'Ophth., Jan., 1906.
(4.) Ophth. Rev., xxii, p. 234.
(5.) Archiv. d'Ophth., Aug., 1906.
(6.) Archiv. d'Ophth., July, 1907.
(7.) Archiv. d'Ophth., Sept., 1910.
(8.) Scler. "Corneal Trephining," Elliott, pp. 49 *et seq.*
(9.) Article, "Glaucoma," Graefe Saemisch Handbuch, edit. 2.
(10.) G. F. C. Wallis, *Ophthalmoscope*, Oct., 1913.
(11.) Elliott, Ophth., Oct., 1913.
(12.) Sydney Stevenson, Ophthal., Nov., 1913.

GLAUCOMA.

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It is to the credit of British surgery that Mackenzie, in 1830, was the first to draw attention to the increase of intra-ocular pressure in glaucoma. Some twenty-five years later Von Graefe convinced himself that "the essence of glaucoma lay in the increased intra-ocular pressure, from which all the other essential symptoms could be deduced." Priestly Smith says that the term "glaucoma" implies that the eye is suffering from undue pressure in the chambers, and it is properly applied to every eye thus affected. He further says that glaucoma is a morbid process, depending essentially on an excess of pressure in the chamber of the eye. If these views be correct, we have, I think, in the operations of Lagrange, Elliott, and others, methods of relief which should result in the large proportion of cases in permanent cure of this disease, which affects, according to Fuchs, about 1 per cent. of all eye cases. While we were dependent upon palpation for our estimation of tension we could not be always sure of our results. Still, now and again observers came across cases which raised doubts in their minds as to the part played by hypertension in the production of glaucoma signs and symptoms. With the advent of the Schiotz tonometer, however, our records have been much more accurate, and we are in a position to investigate the relation of intra-ocular pressure to glaucoma as a cause of its signs and symptoms.

The relationship of intra-ocular pressure to glaucoma may be considered under the following heads :—

1. Can glaucoma occur without increased intra-ocular pressure ?
2. If intra-ocular pressure is the cause of glaucoma, to what extent must the intra-ocular pressure be raised in order to produce glaucoma ?
3. For what length of time must the tension be raised in order to cause glaucoma ?
4. Does increased intra-ocular pressure occur without glaucoma ?
5. Does high intra-ocular pressure produce glaucoma ?

With regard to question 1 : We must first consider what is normal physiological tension. The investigations of Schiotz, Ruata of Palermo, and others over a large series of cases show that the normal tension as determined by the Schiotz tonometer varies from about 9 mm. to 25 or 27 mm. Hg.

It is evident then that when some rise of tension occurs in eyes the physiological tension of which is low these eyes may still give a reading which lies below the upper physiological limit. Thus, if the normal tension of two eyes be 9 and 27 respectively, an increase of tension by 18 mm. will give a reading in the first eye of 27 mm. and in the second of 45 mm. Yet on examining these two eyes by the tonometer we should be unable, in the absence of other evidence, to say that the first had a pathological tension, while the second eye, with precisely the same increase of tension, would be regarded as undoubtedly pathological.

That this is not alone a theoretical consideration is pointed out by Heilbrun (Arch. f. Opth., 1911), who, after reporting a case from Von Hippel's clinic, says, "This case indicates that a rise of tension within otherwise normal tension range may already be pathological if the eye has a low physiological pressure." He also (*ibid.*) quotes a case of Stock, in which there were rises of tension within the normal range and yet with typical symptoms of glaucoma. But he also admits that if the examinations had been sufficiently exhaustive it is possible that a tension above physiological limits might sometimes have been found. Stock considers that there are cases in which, while the tension remains within normal limits, it is still pathological, and Meller thinks that in glaucoma simplex some rise, even if slight, takes place.

Glaucoma appears to be associated with lymph addition, mainly to the vitreous, and such increase would result in some rise of tension, however temporary.

It is therefore probable that some rise of tension always occurs in glaucoma, but it is possible this rise of tension may not be sufficient to raise the tension of the affected eye above what is regarded as the physiological limit.

I would here say that it is certain that some at least of the differences in the tonometric readings of normal eyes are due to differences of corneal curvature, and that for a more exact estimate of the intra-ocular pressure it is necessary to measure and estimate the corneal curvature. If this be done, and we have the tension of a healthy fellow-eye to guide us, the estimate of pathological tension will be rendered much more accurate.

2. If intra-ocular pressure be the cause of glaucoma, to what extent must this pressure be raised in order to produce glaucoma? It would appear from our knowledge of cases of glaucoma simplex and from the observations quoted under question 1, that the rise may be little if at all above what we regard as the physiological limit. One case of glaucoma simplex, a woman aet. seventy-four, whom I have had under observation for some years, has given an average tension in the right eye of 19 mm., and in the left eye of 27·4 mm. Kraemar says, "Many cases of excavation occur without rise of tension over 30 mm." (Heilbrun, *ibid.*)

Mr. S., aet. forty-three, has given during weekly or fortnightly examinations extending over two years an average of 36·3 mm. in the L. eye, which shows deep cupping and a progressive glaucoma fixed notwithstanding iridectomy, and 32·8 mm. in the right eye. This eye has a large cup which might be physiological, but it shows no other evidence of glaucoma.

Mr. E. A. C., aet. sixty-five: L. eye trephined. R. average tension taken almost daily over three months, 29·5 mm. Disc slightly cupped and characteristic early paracentral scotoma. The obscurations of vision, rainbows, redness, and discomfort of which glaucoma patients may complain have been interpreted by us as being due to rises of tension. Have we been justified, however, in assuming that these symptoms are undoubtedly associated in all cases with an increase of tension beyond that which is normal for other eyes?

Heilbrun (*ibid.*) reports exhaustively on cases, from which I give some extracts: "Since 4 p.m. again a feeling of pressure and seeing of rainbows. T. taken immediately; R. = 19 mm." Three days later he says, "Rainbows still persist. T.R. = 16 mm."

In another case he says, "R. tension has been lowered for some time; in spite of this rainbows and obscurations occur. T.R. = 8 mm."

A case of my own upon whom I performed Elliott's operation a year ago still gets attacks of redness and discomfort with obscuration of vision relieved by eserine, and these attacks have occurred with tensions of from 17 mm. to 33 mm.

We see, then, that not only glaucoma simplex but also these exacerbations of glaucoma have shown tensions, some of which were well within the physiological limits of intra-ocular pressure. With regard to the tension during acute attacks, Heilbrun says (*ibid.*), "R. cornea slightly hazy and stippled; *a.c.* shallow. Before attack V – H.M. (hand movements); during attack V = P.L. Later: L. eye cloudy and stippled, cornea $\bar{c}$ rainbows and lowered vision. T. = 72 mm. Vision before attack, $\frac{5}{5}$; during attack, not stated."

Langenham quotes a case: T. before eserine, 21 mm.; after eserine, 10 mm. Four days later acute attack, T. = 62. And another: T. before pilocarp, 25·6 mm.; after pilocarp, 17·5 mm.; and eight days later, T. 41 mm., with pains and rainbows.

A case of my own was G. D., aet. forty-eight (13/7/12): After reading the newspaper in the evening went out into the garden, and noticed the R. vision suddenly failed, and the L. vision dim. There was acute pain in the R. eye and R. side of head, and dry retching. Seen next morning, V.R. = fingers at 6 in.; V.L. = $\frac{6}{12}$, T.R. = 72, T.L. = 40. R. injected and cornea hazy. Eserine used four-hourly R. and L. and leeches R. Saline purge. (17/7/12): R. attack subsided; acute attack T.R. = 35; T.L. = 60 mm. Double sclero trephine. (13/3/13): V.R. $\frac{6}{6}$ partly; T. = 17. L. = $\frac{6}{6}$ partly; T. = 20. Slight peripheral contraction of fields. No paracentral scotoma. Iris atrophic R. and L. Small physiological cup R. L. fundus appears quite healthy.

We thus see that attacks of pain, redness, rainbows, and lowering of vision may occur in glaucomatous eyes with tensions varying from 8 mm. to 72 mm. Nor does the duration of the tension appear to be an important factor in the production of a glaucomatous attack. In one of Heilbrun's cases (*ibid.*) the tension taken two days before a glaucomatous attack was 32 mm., and at the height of the attack was raised to 72 mm.

A few years ago I examined the eyes of a patient who had been attended some fifteen years previously for an acute attack of glaucoma in one eye by my colleague Dr. J. W. Barrett. In deference to the wishes of her friends, operation was avoided, eserine was used, and the attack subsided. When this patient was examined by us fifteen years later there was no trace of glaucoma. Here the attack could scarcely have been an exacerbation of chronic glaucoma. We can, I think, conclude that while in a glaucomatous attack there is probably always some rise of tension, both the amount of the intra-ocular pressure and the length of time during which it has persisted are very variable.

There are two other questions still to be considered—(4) Does increased intra-ocular pressure occur without glaucoma? and (5) does high tension cause glaucoma?

With regard to question 4, I am of opinion that increased intra-ocular tension without glaucoma occurs not infrequently. Miss X., aet. twenty-three, a typically healthy girl. R. eye pinguecula, which reddens on exposure and on prolonged use of the eyes; twitching of the lids of the left eye.

$$(19/2/13):\ \text{V.R.}\ \bar{c}\ \frac{+1\cdot5}{+0\cdot5\cdot180^\circ} - \frac{6}{4};\ \text{L.}\ \bar{c}\ \frac{+1\cdot25}{+0\cdot5\cdot180^\circ} - \frac{6}{4}.$$

Small central physiological cups. Fields normal. No scotoma. T.R. = 37 mm; T.L. = 32 mm. Blood-pressure, 136 mm. Hg. Treatment: Glasses and boracic drops. (22/2/13): T.R. = 33 mm., L. = 27 mm. (28/2/13): T.R. = 33 mm., L. = 25 mm. (11/4/13): T.R. = 27 mm., L. = 23 mm. (10/7/13): T.R. = 23 mm., L. = 23 mm.

If we consider that variations of intra-ocular pressure may occur with variations of lymph-output or with variations of drainage, it would be strange if rises of tension did not occur fairly frequently.

(5.) Does high intra-ocular pressure cause glaucoma? We have seen that glaucomatous acerbations may occur with tensions varying between 8 mm. and 72 mm., and that the duration of the pressure does not appear to be an essential factor.

I now wish to put before you a case which I think should be recorded exhaustively, because I believe that it will show that increased intra-ocular pressure existing over a considerable period has not been accompanied by the signs and symptoms which were to have been expected under the pressure theory of glaucoma. This case also shows the variations of tension which may occur in a normal eye.

Miss McL., aet. twenty-five, came under observation 17/2/13. She stated that the R. eye had been red for nearly twelve months, and lately had begun to be discoloured. Apparently she had had an extensive scleritis, and the sclera now presented a bluish-black appearance. Under homatropine and cocaine the vision was,—

$$\text{R.}\ \bar{c}\ \frac{75}{+\cdot25\ 30^\circ} - \frac{6}{18};\quad \text{L.}\ \bar{c}\ \frac{+1\cdot5}{+1\cdot5\ 80^\circ}\ \frac{6}{6}\ \text{partly.}$$

The white fields were normal with 10 mm. object, and there was no paracentral scotoma with 2 mm. white or red object. The fundi were healthy. There was no cupping. T. = 37 mm. (18/2/13): 9.30 a.m.—Holocain, T.R. 33; T.L. = 12 V.—$\frac{6}{18}$; 11 a.m.—After hom. and cocaine, R. = 47, L. = 13; 1 p.m.—After hom. and cocaine, R. = 65–70, L. = 12; 2 p.m.—After hom. and cocaine, R. = 65, L = 12; venous and arterial pulsation; 4 p.m.—Under H. and C., T.R. = 45; 6 p.m.—Eserine 6.30, T.R. = 70, V. = $\frac{6}{18}$. (19/2/13): V.R. = $\frac{6}{18}$, with difficulty; T.R. = 47. (20/2/13): V.R. = $\frac{6}{12}$; T.R. = 50. (21/2/13): T.R. = 35 mm., after H. and C.; T. = 50. (22/2/13): V.R. = $\frac{6}{9}$ partly; T. after H. and C. = 60. (24/2/13): T.R. = 44; L. = 17, after H. and C.; T.R. = 50 to 55 mm. (25/2/13): T.R. = 30–35 mm.; V. = $\frac{6}{9}$; T. after H. and C. = 50; V. = $\frac{6}{6}$ – 1 letter. (26/2/13): T.R. = 44; L. = 16. (1/3/13): T.R. = 37; V. = $\frac{6}{5}$ partly. (5/3/13): 9.30 am.—R. = 27; L. = 9; 1 p.m., after H. and C., 50 = 15. (6/3/13): T.R. = 45.

On 4/3/13 this patient was kept under homatropine and cocaine for a whole day. Next morning the diameter of the R. pupil measured 7 mm., the L. 6 mm. The tension of the R. eye was 27 mm.; of the L., 9 mm. Three hours later, after homatropine had been instilled several times, the diameter of the R. pupil remained at 7 mm., while the tension had risen to 50 mm. The L. pupil was 7 mm. and the L. tension was 15 mm. This suggests that the blocking of the angle by the thickened root of the iris was not the cause of the increased tension. This patient came under observation again on the 13th May. (13/5/13): V.R. = $\frac{6}{5}$ partly; T. = 45 mm. under holocain. The fields were normal, and scotomata absent. (14/5/13): T.R. = 42. (15/5/13): T. R. = 40. (17/5/13): Under eserine, R. = 30, L. = 10. (18/5/13): Under eserine, R. = 35. (19/5/13): Under eserine, R. = 37, L. = 12. (20/5/13): Under eserine, R. = 27, L. = 9. (21/5/13): Under eserine, R. = 32. (22/5/13): Under eserine, R. = 30, L. = 25.

During August the tension, taken several times daily, averaged 54·3, and was on some occasions as high as 80 mm. During September the average of the whole of the observations of tension was 62 mm. The tension on only one occasion fell below 47 mm. There was no reduction of the field, no enlargement of Mariotte's spot, and no scotoma could be found on searching the field with a 2 mm. grey object. Occasionally faint relative scotomata were found in part of the paracentral area. The vision did not fall below $\frac{6}{6}$ partly. The radius of curvature of the right cornea was H. 7·5 mm., V. 7·3. mm. The disc was reddish throughout and gave no indication of cupping. Arterial pulsation was constantly found. Media were clear. The refraction did not alter. Failures of vision occurred some half-dozen times. Early in October the failures became frequent. The tension varied from 60 to 80 and showed little reduction under eserine. The vision had increased to $\frac{6}{5}$ partly, with no alteration of the fields and no scotomata. A trephine operation was done while the tension was 80 mm. The conjunctiva was very thin and adherent. A 1·5 mm. trephine was used. The iris prolapsed fully into the wound and a complete iridectomy was done. Ten days later the vision was $\frac{6}{6}$ partly. There was some haze, apparently of the vitreous, and some increased redness of the disc.

In this case it is reasonable to assume that the normal physiological pressure was approximately the same in both eyes. The corneal curvature showed little difference in the two eyes, and while this measurement is of course only that of the central 3 mm., any marked corneal irregularity of the two sides would have shown itself in the refraction or in the vision when tested with dilated pupils. As the tension of the L. eye averaged about 14·5 mm., and as the tension of the R. eye on one occasion fell to 27 mm., it is probable that the normal tension of the R. eye was under 20 mm. If we then compare the tensions recorded with some of those in primary glaucoma cases, we will see that both for extent and duration of rise of T. the results are wholly dissimilar, and I think we must conclude that tension *per se* has little effect in the production of a glaucomatous attack. Indeed, this case supports the experiments of Gronholm, which tend to show that increased vitreous pressure may empty the eye of blood (to which I ascribe the visual failures) but does not produce congestion.

When this patient came under observation at first the vision was $\frac{6}{18}$, and while the T. was being raised by H. and C. the vision gradually improved to $\frac{6}{5}$ partly. Later, when the tension, in spite of eserine, remained continuously high. the vision varied from $\frac{6}{6}$ partly to $\frac{6}{5}$ partly. Further, during the early examinations a paracentral scotoma developed concurrently with the increased tension, but this rapidly disappeared again, and, except on one or two occasions, when a doubtful relative paracentral scotoma was detected, no defect of the fields could be made out by repeated searching examinations. There was no further interference with function than at times a slower adaptation with the photometer.

I think the improvement in vision which took place in the early stage may be explained by increased lymph-effusion, as the result of the mydriatic and consequent better nutrition of the retinal elements, while possibly the early paracentral scotoma may have been due to toxaemia of the nerve, which disappeared when increased intra-ocular pressure opened posterior drainage channels.

Lagrange (Arch. d. Oph. 1913), after recording a case in which, in spite of operation which "perfectly normalized" the tension, the vision gradually failed and the fields contracted, says, "This want of success is very rare, because, after all, the affections of the optic nerve, independent of hypertension, are quite exceptional, and because the hypertension without being the whole of the glaucoma is by far the greatest factor of the disease" (*de beaucoup la plus grande partie du mal*).

Of course, hypertension, if it means lymph-stagnation, must produce a nutritive deterioration, and probably distension of the globe, cupping, and other changes, but I think the above case will help us to differentiate these changes from the glaucomatous attack.

To sum up the position, we find that exacerbations of glaucoma may occur with as low a tension as 8 mm. ; that acute attacks of glaucoma occur with tensions of 64 and 72 mm. On the other hand, tension of 60–80 mm. may produce no glaucoma symptoms.

Pressure cannot, then, be the chief factor in the production of the attack. The difficulty in ascribing a cause vanishes if we conclude that while lymph-addition is constantly present the attack depends upon the quality and not upon the quantity of the lymph effused.

This view would explain why, after operative procedures which permanently reduce the tension, we in some cases find a steady, though slow, deterioration of the visual functions.

The case of Mr. E. A. C. quoted above is an instance of this. The early relative paracentral scotoma in the second eye showed slight progression, and a trephine operation was done with a resulting tension of 10 mm. Immediately after the operation the scotoma was more pronounced, and is apparently progressing, though very slowly. I am afraid that we shall find, in spite of trephining, that the disease has been only checked in a number of cases, and that these are especially the ones which show the paracentral scotoma as an early sign.

It is to be noted that Bjerrum (Klin Monatsbl. f. Augenheilk, 1912) has, from a different standpoint, already advanced the theory that glaucoma is an inflammatory process of a toxic origin.

Further, Elliott says (*Ophthalmoscope*, October, 1913), "One cannot review the above evidence without a deepening conviction that toxicity, possibly in many forms, is playing no unimportant part in the pathogenesis of some, at least, of the conditions which we now, for convenience sake, are content to group together under the term 'glaucoma.'" Personally I feel that if we are able to set aside the idea that hypertension is the dominant factor, we shall proceed to classify our cases, and not be so satisfied with the treatment based upon a physical conception of the signs and symptoms of glaucoma.

DISCUSSION.

In the discussion on glaucoma which followed several members expressed their views on the subject.

Dr. H. LINDO FERGUSON (Dunedin) referred to cases of sepsis following Elliott's operation that had come under his observation.

Dr. J. W. BARRETT (Melbourne) said that in his experience iridectomy had been the most valuable of the various operations he had tried up till the period at which the formation of a filtering scar had been suggested. Prior to that period he had tried the effect of performing iridectomy with a conjunctival flap, leaving a portion of the iris in the wound.

There was no doubt the various forms of iridectomy had permanently cured a number of cases, but it was equally true that several iridectomies had utterly failed to prevent the destruction of some eyes, even though the tension was not high. He would like to cite two typical cases.

A lady consulted him in 1898 with marked glaucoma in the left eye. The tension was from plus 1 to plus 2; the vision was six-twelfths; the field was contracted and the disc was cupped. A large iridectomy controlled the tension, but the vision wholly failed. Many years afterwards she returned with a number of anomalous symptoms in the right eye. She noticed slight obscuration of vision and saw coloured fringes to lights at times. There was, however, no rise of tension. There was no cupping and there was no contraction of the field. A large iridectomy was performed, and the iris was found to be degenerate and rigid —distinctly thickened. The only positive sign of glaucoma in this eye before operation was arterial pulsation induced by low pressure. Notwithstanding the iridectomy and a tension well within the normal, deterioration continued, the field became contracted, paracentral scotomata made their appearance, and a trephine operation was done, notwithstanding the fact that the tension was comparatively low. Whether the vision will remain is a matter of speculation. Here, then, advanced organic changes occurred in the eye without appreciable rise of tension or other symptoms.

The other case was that of a postman who, at thirty-five years of age, had lost one eye from glaucoma. The other eye showed occasional signs of temporary high tension, with steaminess of the cornea. These attacks were very transient, and were at once relieved by eserine. A large iridectomy was done, and for thirteen years there was no further trouble. The iris was found to be degenerate at the time of operation. Thirteen years later he came back with some cupping of the disc and some rise of tension. Several iridectomies were performed in succession, until the whole of the iris was removed. None of these operations produced more than transitory improvement.

This was about the time at which the newer operations were making their appearance, and a large number of operations were done on this eye in the hope of saving it. A piece of sclerotic was removed behind the ciliary body. As soon as the wound closed the tension rose again. A set of Lagrange and trephine operations were done round the cornea margin, and in a number of them the tension remained permanently low, and so far the iris held its own. The last operation was performed two years ago.

There is no doubt whatever that tension in itself does not necessarily cause damage to an eye. It depends what causes the tension.

It is noteworthy that the tension caused by an anterior synechia may persist for a very long while without damaging the vision. It is, of course, known that very high tension may exist in sympathetic ophthalmitis without destruction. It is noteworthy that high tension may exist for many days with acute iritis, and yet twenty-fours hours of tension no greater than that referred to may cause total and permanent destruction in acute glaucoma, and tension of a few minutes' duration may cause lowering of the vision in subacute or chronic glaucoma.

Is it not clear, then, that there are two factors at work—bio-chemical nutritive changes which are the cause of the glaucoma, and the tension which is a usual but not invariable concomitant ?

In the course of a considerable operative experience he had performed iridectomies in advanced glaucomas, and after the operation had demonstrated to colleagues the fact that although the anterior chamber was collapsed, the tension of the eye was not appreciably reduced. In such cases he had not infrequently passed a Graefe knife through the sclerotic into the vitreous, and made one, or even two, L-shaped cuts. No vitreous had exuded, and the tension had not been lowered. Recently he demonstrated the fact that after a successful trephining operation with iridectomy the tension immediately after the operation was not lowered, though it became very much lower a few days later, and this evidence tended to show that whatever was the ultimate source of the bio-chemical changes which cause glaucoma, the vitreous was profoundly involved.

There was no doubt to his mind that the fingers were an unreliable guide.

He had recently reported a case in which the tension of the right eye was within normal limits, and always lower than the left, yet the vision of the right eye was damaged to a far greater extent than the vision in the left. On performing an iridectomy the iris of the right eye projected with violence, and considerable haemorrhage followed the operation. Three days later, although the wound had closed and there was no infection, the haemorrhages and congestion of the exterior of the sclerotic were intense. The corresponding operation on the left eye gave no trouble. Did not this indicate that a vicious toxaemia had involved the eye with the lower tension and not the eye with the higher tension ?

It seemed to him that the trephine operation performed could only relieve one symptom—viz., the high tension—though iridectomy might not only relieve tension, but effect these bio-chemical changes which are probably responsible for the diseases. Consequently he preferred in the chronic cases to do a trephining operation, and remove through the trephine hole a very large piece of iris. He had seen one case of disaster follow the trephining operation, the anterior chamber having collapsed and never having reformed.

He had not seen cases of iritis. Such cases as those recorded by Dr. Lindo Ferguson would tend to make him keep trephining as an operation of last resort if they were found to be general, since they did not occur in simple iridectomy.

To his mind, the operations for glaucoma had been largely influenced by an unsound theory—viz., that glaucoma was synonymous with high tension, and that all operations were undertaken for the relief of tension. It was probable, as Elliott, and Orr, and others had pointed out, that many diseases were grouped for convenience under the term "glaucoma," and that some of them were attended with high tension and some not. For this reason he was inclined to welcome the suggestion of Dr. Lockhart Gibson that stress should be laid on the general condition as well as on the local treatment of glaucoma. It may be that, as in cases of irido-cyclitis, toxaemias arising from various operations of the alimentary tract played a part in the production of the phenomena of this complex clinical condition.

THE EYE AT SCHOOL.

By G. H. Hogg, M.D. (Edin.), Launceston, Tasmania.

We read much nowadays of diseases of occupation, and of occupations which cause certain diseased conditions. One of the most important—perhaps because the most general, affecting as it does practically every child in the State—is the occupation of scholar, and it is to one organ which is most concerned in that occupation to which I wish to direct attention.

The eye, undoubtedly, in school life plays a leading part, and it must be remembered that during the years of school life it is an organ which is growing, developing, and undergoing continuous change. The refraction of the eye is not a fixed quantity; at first in young children usually hypermetropic, the hypermetropia gradually lessens until the eye becomes emmetropic, and in some cases even myopia eventually develops.

This hypermetropia, which the child appears to share in common with savage races and wild animals, seems a clear indication that nature intended the eye to be used for distant vision, not for the near vision and constant strain of school life; even when emmetropia is the existing state of refraction one finds that the eye in its natural condition of rest is an organ adapted for distant vision, and that for near vision a continuous effort has to be made, and a complicated mechanism both nervous and muscular has to be brought into play.

The brain-part of the visual mechanism, too, has to be developed, and the delicate and complex system of co-ordination of brain, eyes, ears, and hands gradually evolved.

The use of the eyes for near work, with the muscular effort and the increased blood-flow to these organs which has been induced not only by the extra work, but by the stooping of the head over the task, incline the eyes to strain and to weakening of the tunics of the eye, which tend to cause the development of any defects to which they may be predisposed, or the exaggeration of any which may already exist.

Any system of education, therefore, like ours, which compels the eyes of children to carry on continuous near work and to focus small objects at close range for several hours daily, is more or less an unnatural one, and too great care cannot be taken so as to avoid as much as possible the evil results which the violation of a natural law involves.

If even under the most favourable conditions, with properly lit schoolrooms, good desks, well-printed books, &c., some harm may ensue, how much greater mischief may be wrought by unhygienic schoolrooms and unscientific methods so commonly met with?

This is no new "fad" that I am elaborating. For years oculists have spoken and written on it, but I am afraid that it is overlooked too often not only by many of our own profession, but, what is worse, by educationists. It is a startling, if at the same time a regrettable, state of affairs that educationists from whom one might expect something better have been so regardless of scientific observations and principles touching this and other cognate matters.

It makes one prone to agree with the hygienist who affirmed that the head of a Board of Education should be a medical man, and that until then no system of education would be conducted on sound principles. Although we cannot be expected to allow our children to grow up in ignorance, or the educational systems of our time to be destroyed, we can insist on these systems being founded on physiological principles and administered on scientific lines, and it is to the members of our profession that we must look for reform.

The health of the eye at school may, so far as my present subject is concerned, be regarded as dependent on (1) the architecture of the school and schoolroom; (2) the lighting of the schoolroom; (3) the design and proportion of desks and seats; (4) the character and amount of the school-work—reading, writing, sewing, &c.

I propose to deal at any length with only two of these.

Firstly, as regards the architecture of the school, I think no license should be given for the erection of new schools until the plans have been examined and approved by competent medical advisers. This would prevent the continued erection of buildings which in the past have violated almost every law of school hygiene.

Secondly, the lighting of schoolrooms is a most important factor, and one which requires careful consideration. Exact observation, and not haphazard statements, are necessary in dealing with this question. It is frequently stated that a schoolroom is well lit, but if one inquires how the light is estimated there is no answer save a general statement. We are much too inclined to accept these general statements as to the illumination of schools, and there is nothing in school hygiene in which such are so deceptive and misleading. If one were to inquire of a medical officer as to the purity of a water-supply he would prefer a definite analysis to a general answer. I have found the lighting of a "well-lit" schoolroom to be as low as 5 f.c.

It must be remembered that a room which may be well lit on a sunny day or at a particular time of the day may not be so at another time, and that one ought to estimate the lighting of a schoolroom by its minimum, not by its maximum. The lighting of any room may be tested by means of any of the simple photometer tests, and the light on desks and blackboards should be estimated. The photometers of Truc, Katz, Bishop Harman, &c., may be used, or in place of these one may be guided by the rule that one ought to be able to easily read diamond type at 12 in. with the normal eye.

Another point which is sometimes overlooked is that the lighting of a schoolroom may be very unequal. I have found in a room the light varying from 4 f.c. to 35 f.c.; in another, from 0·75 f.c. to 10 f.c., according to the part of the room; and I have more than once found the ametropic child seated at the desk of low-candle-power illumination while his more fortunate emmetropic companion was enjoying the better light. Of course, I do not wish to infer that the dullness of the illumination was the cause of the ametropia, but such an observation goes to show the importance of a sufficient and regular illumination being secured, which can only be brought about by having the ocular hygiene of schools put on a proper scientific footing.

As a general rule for the lighting of a school one may say that—firstly, there cannot be too much light; secondly, on a dull day in the most badly lit corner of the room the light should not fall below a minimum of 9 f.c.

The proportion which window-surface—*i.e.*, transparent glass—bears to the floor-space should be about 1 to 3 or 1 to 4. Cohn and Risly fixed 1 to 5 as the absolute minimum; in a model Russian school it was 1 to 2; in the Ferrand School of Paris it was 1 to 1; while in the Franklin School at Washington the window exceeded the floor space.

Direction of Light.—All ophthalmologists are agreed that the left is the best direction by which the light should enter the room. Bilateral illumination is, as a rule, to be condemned, the opposing windows causing cross-light and shadows; and, in the words of Trelat, "*les silhouettes vompiers ne se degagent pas les modelés sont perdus dans les valeurs effacées la faime & la couleur se devobent.*" Some approve of bilateral differential illumination—*i.e.*, the window-space on the right to be not more than half that on the left. If the schoolroom has been so constructed that it is necessary to have some lighting from the right, such windows should not have their sills lower than 8 ft. from the floor. In this way the ceiling of the room is well illuminated and the light diffused in the room. Even then, however, cross-lights and shadows may be troublesome. Illumination from the rear in itself is to be condemned, and even when combined with left lighting is often unsatisfactory. In most schoolrooms where lighting is from behind, the teacher and blackboards are facing the windows, the glare and reflection on the polished surface of the boards make the figures and letters hard to distinguish, and the teachers, almost without exception, complain of their own eyes.

The windows, which should be therefore on the left, should not be lower than 3½ ft. to 4 ft. from the ground, so that the light should enter above the heads of the children, and luminous reflections be avoided; in height they should reach to the ceiling. It is most important to see that as little space as possible should exist between the windows, for which reason the piers between may be made of iron, so that as little room as possible be required. If there is any brick or wood work between, it should be made as narrow as possible, and bevelled. Indeed, considering the great improvements which now exists in glazing, as is evidenced by the beautiful windows of large shops, there is no reason why similar windows should not be employed in schools.

If these points are not attended to there will be great irregularities in the lighting of schoolrooms, and we will find broad bands of light alternating with bands of shadow, which prove confusing to the eye. In addition, at the desks which correspond to the dull interspaces between the windows, the amount of light may be considerably lessened. I have found a variation of 20 f.c. or more at different desks in a schoolroom as a result of such errors.

Javal and Cohn both approved of lighting from above. It is made use of in the lighting of some lecture-rooms, and is much preferred by artists for their studios. From the side of practical school hygiene, however, it is out of the question. Where buildings are close to the school, and interfere with the lighting, the light may be attained by the use of reflectors mounted on hinges at an angle of 35°–40° outside the windows. In this way the light is reflected on to the ceiling of the room. The colouring of schoolrooms is important, sometimes a room which would otherwise be suitable being spoilt by too dark tints. The surface of walls should always be dulled, not shining. Reds should never be used, as they absorb too much light. Some authorities recommend faint yellows, which absorb little light; these, however, apparently are more likely to cause ocular fatigue than are greens or light greys, which are more restful to the eyes, and at the same time absorb little light. The ceiling should always be white, so that as little light as possible is lost by absorption. Where there is a large space of blackboard in a schoolroom, this, when not in use, should be covered with a sliding blind or cover to prevent the large absorption of light which takes place. As indirect solar light diffused and toned by the media through which it passes is the best illuminant, in the day-schools of Australia the question of artificial lighting should not need to be considered, but in night-schools and boarding-schools it is an important one, in some the artificial lighting being very bad. Sources of illumination are usually two in number—gas and electricity. If gas is the illuminant the ordinary gas-flame is too yellow and too unsteady for the purpose, so that an incandescent mantle should be used with some special globe, such as the modern dioptic globe, which spreads the outline of the source without materially lessening the light by absorption. At the last (1913) Gas Exhibition in London a model schoolroom with artificial lighting was shown, in which the chief point was the illumination of the blackboard by a light immediately above and in front of it. This was backed by a dark metal shield, so that the lamp was invisible to the class. Illumination was secured for each desk without allowing the rays of light to fall injuriously on the eyes of either scholar or teacher. The minimum illumination for any desk was 2½ f.c., while for the blackboard a standard of 2 f.c. was admitted to be sufficient only for small class-rooms where the scholars were within 20 ft. of the blackboard. Both for gas and electric light 3 f.c. should be fixed as the minimum. Electric light is becoming more and more common, and is very convenient to use.

The naked arc lamp, the carbon lamp, and the metallic filament are all too trying to use in continued work.

The lamps in common use are the carbon and metallic filament enclosed in glass bulbs. It must be remembered, however, that apart from the mere intensity of their light, the ultra violet rays which they emit often prove trying to the eye.

I cannot agree with the statements often advanced in favour of electric lighting that its introduction has never been followed by an increase of eye-disease or errors of refraction.

While I have never seen any serious disease develop, I have frequently noted irritability and weakness of the eyes follow upon the use of electric light, especially where metallic filaments have been used, and I am quite sure that it plays a part in some asthenopic cases. I have noted clerks and workmen who had been employed in the same work, within a short time after the use of electric light as an illuminant, complain of eye symptoms.

In some people, whether emmetropic or not, metal filament lamps are productive of much ocular discomfort; and I have from time to time seen cases, in which an astigmatism was present without causing the patient any inconvenience, begin to be very troublesome when he or she took to reading by electric light. Similarly, I have seen children with asthenopia and blepharo-conjunctivitis, who had been doing their lessons by electric light or incandescent gas, lose all their trouble on cessation of this. Although perhaps it is unsuitable for use in schools, still, for homework and in small study-rooms, I know of no better artificial light for child or adult than that given by a high-grade oil-lamp, and I have frequently found such a change from gas or electric light prove highly beneficial.

Thirdly, the design and proportion of desks and seats I do not propose to touch on in this paper. Several good types are on the market, and teachers ought by now to realize the importance of proper furniture. Even with hygienic desks and seats, children are prone to stoop over their work. Teachers should be constantly on the *qui vive* to stop this, and to check the habit which children so readily develop of bringing their work too close to their eyes, for which purpose the face-rest might with advantage be made more use of in schools.

Books, &c.—The importance of properly printed books seems hardly to be appreciated either by educationsts or the general public. Here, too, general statements are usually accepted instead of accurate observations. If one inquires what standards and regulations are used in the choice of school-books, as an almost invariable rule one finds that there are either none at all, or that what there are are based on no definite scientific principle; in fact, it is the exception to find educationists who are acquainted with the observations and laws of Cohn, Javal, &c. Some years ago I drew attention to this matter, and published tables bearing on it in the agenda of the Congress of 1911. It was therefore very interesting to me to notice that a Committee was appointed by the British Association of 1912 to report on the question, and that this Committee has emphasized its importance. The Committee find, as I have, that no systematic attention is given to the influence of school-books upon eyesight.

Briefly, let me indicate the essentials; to go into full details would trespass too much on space.

The paper of the book should be opaque, so that none of the printing from the other side can be seen through it; it should not be bibulous, so that there should be no running of the ink or staining; it should not be glazed or shining, so as to prevent confusing reflection of light.

The best tint is probably a soft cream or what the French call *couleur bois ;* a pure white is not so good. The type should be clean cut and well defined.

Size of type: Let me quote from a former paper of mine: " As you are doubtless aware, Dr. Hermann Cohn, of Breslau, who investigated this question thoroughly, is of opinion that taking the roman " n " as a basis for measurement, all type which is less than 1·5 mm. in height is harmful to the eye, and should be prohibited ; the smallest leading which should be allowed is 2·5 mm., and the greatest length of the line should not exceed 9 cm.—at the most, 10 cm. As regards the thickness of the letters, the down stroke should be at the very least 0·26 mm. thick, and, according to Schneller, 0·3 mm. Griffing and Franz in their investigations showed how a greater time is taken to read the smaller type, and fatigue therefore more easily induced, and how the strength of the light necessary to read with increases rapidly as the size of the type diminishes. This is a most important point, for in many of our schools the lighting is at times much below the normal standard, and consequently, if the size of the print, &c., is too small, the strain and fatigue of the eyes is much increased."

—	Model Book.		Books examined.	
	Size of Letters.	Leading.	Size of Letters.	Leading.
	Mm.	Mm.	Mm.	Mm.
1st Reading-book	2·6	4·5	2·0	3·0
Poetry in 1st Reading-book ..	..	..	1·5	3·0
2nd Reading-book	2·0	4·0	2·0	3·0
Poetry	..	..	1·5	3·0
3rd Reading-book	1·8	3·6	1·5*	2·0
Poetry	..	..	1·0	1·5
4th Reading-book	1·6	3·0	1·5*	2·0
Some small type in book	..	..	0·75	1·0
Verses of music	..	...	0·5	1·0
5th Reading-book	1·6	3·0	1·5*	2·0
Small type	..	..	0·75	1·0
Arithmetic-book	1·6	3·0	1·0	1·5

* And less.

Length of line in some books was 11·4 cm.

The first measurements are the minimum ones, which are approved by scientific authorities.

The second measurements are those found in the school-books examined.

The 1912 Committee reports that the absolute minimum is as follows :—

Age of Scholar.	Minimum Height of Face of Short Letters.	Minimum Length of Alphabet of Small Letters.	Maximum of Interlinear Space.	Maximum Length of Line.
	Mm.	Mm.	Mm.	Mm.
Under 7 years ..	3·5	96·0	5·0	..
7 to 8 years ..	2·5	72·0	3·6	100·0
8 to 9 years ..	2·0	55·0	2·0	93·0
9 to 12 years ..	1·8	50·0	2·0	93·0
12	1·58	47·0	1·8	93·0

The interlinear space or leading is important; if too small, the type is more difficult to read, and the eyes of children as well as adults more readily become tired.

The length of the line is often disregarded even in school-books, where the printing may be excellent. If the line is too long the eyes are more readily fatigued.

Arithmetic-books are often the worst examples of improper type. If possible the print in them should be larger than the corresponding types for the age groups, certainly never below the minimum. Long lines and rows of figures are trying to children's eyes, so that they should always be printed on the largest and heaviest type possible.

For children under twelve years of age the height of a fraction should not be less than 3·5 mm.; over twelve years it should not be less than 3 mm.

Bibles, &c., are often very faulty in the printing, and the type much too small.

Greek: Some types are trying to the eye, but with a proper type there should be no eye-strain.

German: The older German lettering and print were very trying to read; now that German books are printed in Roman type, however, this cause of eye-strain should be eliminated.

Maps, atlases, &c.: These are, I suppose, to some extent necessary evils; their use should be strictly regulated and supervised by the teacher. The use of maps crowded with detail and with many names in fine print, and the drawing of such maps, should be prohibited. No atlas should be allowed in which there is type smaller than ten-point.

Music: Girls are special sufferers in this respect; in addition to the usual school-work, they are frequently burdened with music-lessons two or three times weekly, with daily practice added. The type of the music should be good, and the interval between the stave-lines 2 mm. or over.

Methods of Work, &c.—No children under six years of age should be sent to a school, unless it be to a kindergarten. Even at a kindergarten care should be taken that the objects used are not too small, and that eye-strain be avoided. The children should be as much as possible in the open air. Reading should be taught from large type on boards or sheets. Probably no books should be made use of before seven years of age. In all schools there should be far more oral teaching than there is at present. The school-hours should not be too long, and there should be frequent changes of work, so that the eyes get rested from reading and writing, and intermissions for rest and recreation.

Night-work should not be allowed the younger pupils; no homework before the age of eight years is a good rule, and for the elder it should be carefully regulated. As has been already noted, with artificial illumination the eyes more readily become tired, and there is a direct relationship between the strength of illumination and the size of the type which can be read. With artificial lighting, types which might be admissible for use by daylight are too small.

Sewing.—I have already alluded to this branch of school-work in my previous paper, as follows:—

"Sewing occupies an important position in the school-work of girls, and submits their eyes to an additional strain which the boys escape.

And in this relation I would remark that, in my experience, the proportion of girls suffering from symptoms of eye-strain is higher than that of boys, the chief reason being that, in addition to their ordinary work, girls are usually burdened with the additional tasks of sewing and music. I am afraid that few of our educational authorities realize the importance of seeing that this branch of school-work is properly taught; the teachers are too often laws unto themselves, and transgress all the rules of eye hygiene. In some of the sewing-classes which I have visited I have found extremely fine work being done by girls of from twelve to fourteen years of age; for instance, in some work which I examined I have found from forty to forty-eight stitches to the inch, and that sometimes in a room where the illumination was very bad. This was a strain to my own eyes to count even in a good light. What must it have been to a child working in a badly lighted room? On watching classes engaged in needlework I have noticed (1) many children holding their work within 4 in. or 5 in. of their faces, some frowning with that peering expression which accompanies strain of this kind; (2) some children squinting; (3) some children grimacing, putting out their tongues, twisting or opening their mouths.

"Sewing should be taught on correct principles; and as elementary rules I would suggest (*a*) children be not allowed to hold their sewing nearer to the eyes than 12 in.; (*b*) fine sewing of any kind be reduced to a minimum, and no fine work be taught to children below the age of twelve years; (*c*) young children must not be taught stitches of more than five or six to an inch.

"As a result of the non-observance of ocular hygiene we meet from time to time with various eye-troubles; chief amongst these are different forms of ametropia.

"*Myopia.*—I have never been able to satisfy myself that myopia is caused by the strain of school life alone; in almost every case where it has developed from low degrees and upwards I have been able to elucidate a hereditary history. High myopia is very often found in illiterate people, who have never been submitted to any eye-strain at school or been engaged in any near work; apparently the tendency to myopia is hereditary, whether due to some inherent weakness of the fibrous coats of the eye or not, and the strain of educational life plays the active role in its development. As to how this acts is somewhat uncertain, the congestion of the eyeball from hanging the head down, the increase of intra-ocular tension, the convergence of the visual eyes and the muscle-pressure, probably all play a part."

Hirschberg, in his monograph, writes, "If the inherited formation of myopia has a great significance, yet the development of myopia for the most part ensues from the school influence."

In tracing the history of a myopic child it is interesting to notice how in the early stages of school life and in the lower classes the myopia develops only slowly, but as the child progresses in its studies and passes into the higher classes the increase of myopia becomes much more rapid.

Asthenopia, with its various symptoms, whether associated with errors of refraction or not, is of frequent occurrence. Errors of refraction, whether hypermetropic or astigmatic, should be corrected. These may have existed for some time without causing any trouble, but when the eye is submitted to undue strain symptoms develop either gradually or suddenly. Thus I have seen a boy with 0·50D. of astigmatism uncorrected, whose eyes have given him no trouble at school, suddenly develop an acute conjunctivitis and asthenopic symptoms after a few nights hard study for an examination. One must always remember that even the normal eye may suffer if too great a call is made upon it. From time to time I have children brought to me complaining of headaches, eye-aches, &c., whose eyes are apparently normal. On cross-examination one finds that the unfortunate child, often a girl, has been studying nine to ten hours daily, being "crammed" for some examination.

Squint.—Internal strabismus is from time to time seen in schools—I have already alluded to its occurrence in sewing-classes. If already present in the child on his entrance to school it tends to increase; frequently, although latent, it is first made manifest at school by the more or less constant excessive convergence of the eyes for near work. One often notices, too, how a periodic concomitant strabismus is similarly, as a result of school life, transferred into a permanent one.

Heterophoria is, as a rule, not a cause of much trouble in children. If any associated error of refraction is present it should be corrected. I have found it occasionally develop in girls who have been straining their eyes by too much near work, such as fine sewing.

AN UNDESCRIBED PUPILLARY REFLEX.

By H. Lindo Ferguson, M.D., Dunedin.

The accusation that specialists are apt to take too narrow a view of their cases, and to deal with them simply as patients suffering from local affections, thereby treating the symptoms rather than the disease, is probably not so well grounded now as it was twenty-five years ago, and it is many years since I have heard advanced the view which used to be so widely held that no surgeon ought to confine his work to a limited subject till he had gone through an apprenticeship of several years in general practice.

A proviso such as this was clearly unworkable, as the number of men who, having once got into practice, could afford to give it up for a period of hospital-training in a special branch, and then face the period of waiting till they could make a living at it, would have been too small to meet the growing demands for specialists, apart altogether from the fact that the manipulative dexterity which special branches of surgery call for is rarely and with difficulty acquired in middle age.

Possibly the criticism of undue narrowness of view may have done something in stimulating specialists to widen the scope of their work; and that the ophthalmologist has been largely successful in doing so is proved by the manner in which the physician seeks his aid in every kind of nervous disease, and expects him to discuss on an equal footing the problems involved in the diseases of the kidneys, heart, blood, pituitary body, hyperthyroidism, toxaemias, and other poisons, as in all these matters their practices overlap; that the surgeon turns to him on questions of cerebral surgery, and assumes as a matter of course that he has more than a bowing acquaintance with general surgical progress.

Of late a new department of knowledge has sprung up in modern bacteriology, and it is necessary for the ophthalmologist to be sufficiently in touch with it to make intelligent use of the new methods of treatment that the bacteriologist can place in his hands.

The points of contact of our special work with other departments of medicine and surgery are so many that naturally much has been written on the relationship of ocular changes to distant conditions, and there is an extensive literature on the subject, beginning with the recognition of albuminuric and diabetic retinitis and the association of choked disc with intracranial pressure in the early days of ophthalmoscopy, and ranging through a wide series of observations, repeated again and again over a series of years, till finally something like certainty is arrived at as to their reliability.

For example, it must be at least thirty-five years ago since the constant association of sores about the nostrils, with the condition then referred to as strumous ophthalmia, suggested that they may be causally interrelated, and the clinical observation that the phlyctens recurred till the nasal condition improved was repeated from time to time and published by various channels. That the tendency of modern pathology is to look on them both as localized tubercular conditions, is only carrying the clinical observation a step further.

Later than these early observations with the development of nasal surgery came records of eye-troubles associated with nasal obstruction; and more recently still the valuable observations as to the affections of the optic nerves in disease of the sphenoidal sinus throw a flood of light in cases of unexplainable neuritis which have puzzled us in the past.

There is no doubt that the recorded cases of eye-affections from dental irritation which have occurred from time to time during the past thirty years will help in due course to a fuller understanding of the laws which govern reflex irritation of other nerves beside the 5th.

This question of reflex irritation is one which is very apt to assume such importance in the mind of the observer that the general practitioner has some reason to say that the specialist loses his sense of perspective in a too close study of a symptom.

We are all alive to the fact that many cases of asthma can be benefited or cured by cauterizing the nose, but we must confess the results are not as universally beneficial as the earlier announcements foreshadowed; while the results claimed by some of our American confrères from the correction of minimal errors of refraction or from various muscle operations have led to many disappointments elsewhere, and have done much to shake the confidence of the medical world in the sanity of specialists' judgment.

It behoves us therefore to feel our way very carefully in investigating reflex irritations, and to eliminate all possible sources of fallacy in our observations. A blepharospasm coexisting with an unerupted wisdom-tooth or an amblyopia coming on in a patient suffering from intestinal worms may merely be a coincidence. If, other possible causes being eliminated, the eruption of the tooth or the expulsion of the worms is associated with relief of the eye-symptoms, the observation becomes evidence which gains in weight with every additional corroborating observation.

Among the most interesting and difficult to unravel of these reflex problems is the question of how far and in what manner the female pelvic organs influence the eyes ; that they do influence them has been a matter of common observation from the earliest times, and the connection could hardly be overlooked, as so many patients notice it themselves, and volunteer the statement that their eyes are always worse during the period.

Every ophthalmic surgeon has buried in his case-books records of intra-ocular haemorrhages vicarious of menstruation, of amblyopias classed as hysterical, and would have a definite concept in his mind if one spoke of ovarian asthenopia, but would be at a loss if he were asked to lay his hand on any well-marshalled review of our scattered knowledge on the subject.

When Mooren's paper appeared in 1882 it afforded food for much thought, but gave no very concrete help to diagnosis in doubtful cases ; and the same may be said of Mr. Power's Bowman lecture in 1887. Possibly this may have been due to insufficient collaboration with gynaecologists in the study of the cases on which the papers were based. Certainly gynaecology was not nearly so well understood twenty years ago as it is now ; thirty-five years ago it was taught that anteflexion was a displacement requiring correction as much as retroflexion, and the keen and bitter struggles for many years over oöphorectomy, Emmett's operation, Alexander's operation, and its rivals, kept the gynaecologists so busy getting their own department into order that they had not much time to co-operate in finding out reliable links with other parts of the organism.

During the "eighties" I thought that I was going to find a reliable clue to the pelvic origin of many cases of asthenopia in the hyperoemia of the optic nerve which is so frequent in these cases, but I found that though I saw cases in which the hyperoemia lessened with improvement of the pelvic condition, I could not say from the appearance of the nerves in the first instance that they could be distinguished from the hyperoemic nerves we see in epileptics, or in the children of chronic alcoholics, or in male masturbators.

In searching for some sign which did not involve the observer's personal equation, as does the judgment of the degrees of hyperoemia of the nerve, I found that certain cases in which the patient's asthenopia seemed to be insufficiently explained by the error of refraction and the general condition, and in whom the appearance of the disc suggested a possible pelvic cause for the accommodative trouble, showed a pupil-reflex in the shape of sudden dilatation when pressure was made on the iliac region. The symptom is best elicited when the patient lies on her back, with slightly flexed thighs, and pressure is made over the brim of the pelvis. Over a period of years I endeavoured in these cases to obtain an expert gynaecological opinion, and in nearly every instance received a report of some pelvic abnormality.

In 1892 I wrote a paper embodying my observations, which I laid aside in order to see whether later experience would confirm or modify my results. I see on re-reading what I then wrote that I said that I had for the previous six years been in the habit of demonstrating to my students the phenomena referred to above. I have been in the habit of speaking of the typically hyperoemic disc as an ovarian disc, and to the pupil-reflex as the ovarian reflex. I did not offer them any opinion as to whether the pupil-reflex was simply a pain-reflex produced by stimulation of the sympathetic, and therefore on a par with the dilatation which occurs when a hot object is applied to the cheek, or whether it had more definite diagnostic value.

I have naturally many records bearing on these cases since 1892, but it would be beyond the scope of such a paper as this to deal with them in detail. I can merely give the outlines of a few typical cases, and summarize my present views as to the phenomenon.

To dispose first of the suggestion that the reflex is a simple pain-reflex like the cheek-reflex, I may say that I have frequently elicited it without the patient admitting that the pressure causes the least discomfort, while pressure on other abdominal areas does not produce the same result. In several cases in which the symptom was present before oöphorectomy I have failed to obtain it after the operation; in fact, I have never got it after the ovary has been removed; and in a recent case where a girl of twenty had never menstruated, and had been told her ovaries were rudimentary, the presence of this reflex led me to cast doubt on the accuracy of the explanation of the amenorrhoea.

In a very considerable number of cases I have found the symptom marked just before the period, and either much less marked or absent after the period, and look on it as an indication of the ovary being irritated or congested.

The following case of ovarian asthenopia in which I failed to elicit the reflex puzzled me a good deal till the sequel explained the absence of the symptom: The patient—a girl of about twenty—had about 1D of hypermetropia, all manifest, and required about + 3D to enable her to read. Her general condition was good, and there was no ovarian reflex, though the discs were irritable. She used about + 3 for reading for some months, and one day Dr. Roberts told me that he had been called in to operate on her for a strangulated inguinal hernia, and found that the tumour was an enlarged inflamed ovary, which he removed. On visiting her next day he found her reading in bed, and on the table beside her were a pair of spectacles, which he took up and inquired about, when he was informed that for months she had been unable to read without them, but that she then could do so, and could not read with them. This case is of importance as one where ovarian irritation was associated with asthenopia, which ceased with the removal of the inflamed ovary; and the absence of the pupil-reflex is explained by the fact that the ovary was not in its usual position and was not affected by pressure over its proper site. This case is interesting from the prompt relief of the asthenopia, but my case-books afford many equally instructive ones.

(viii, 190.) Mrs. A., for instance, aged thirty-three, had irritable discs and reflexes on both sides, especially the left. She had 0·5DH in each eye, but in 1889 took +2 for reading. Three months later she had to be given +3, and was having transient losses of vision, the fields contracting from the sides as if she had blinkers on. She could not read five minutes before the print began to swim. Dr. Batchelor reported a large tender left ovary. Eight years later she reported that after two years of visual failures she had oöphorectomy performed by Dr. Jeffcoat, since when there had been no more failures of vision and no discomfort about the head. It was not till 1905, when she was forty-nine years of age, that she again took +3D for reading.

(xii, 412.) Miss M. W., aged twenty-two, had serious asthenopia of four years' standing, for which she had been given +0·5 for constant use. Another adviser had vetoed this glass, saying that she was short-sighted. She had about 0·75DH in each eye, and spasm of the accommodation calling for – 0·75 spherical to get $\frac{6}{6}$ vision. She had marked reflexes, and the discs were hyperoemic and irritable, the edges were soft and ill-defined. There was a history of hysteria and dysmenorrhoea. After twelve months she took + 0·75 instead of – 0·75 for distance and + 1·5 for reading, but never could read more than about twenty-five minutes without distress. In 1895—three years after I first saw her—she had both ovaries removed, and they were found to be markedly cirrhotic. Nine weeks after the operation she found her distance glasses too strong, and could only take + 0·5 in place of + 0·75, and a month later the record is that the discs were quiet and no reflexes could be obtained. She was last seen in 1905, and the condition of the eyes had been satisfactory in the interim.

(xix, 72.) Mrs. F., aged thirty-two. Asthenopia and headaches. Photopsies and flickering like cinematograph about vision, dating back to second pregnancy, eighteen months ago. Discs very irritable, retinal veins full, vision $\frac{6}{6}$ H+ 0·25 o.u. Reflexes. Dr. Batchelor, on examination, reports marked retroflexion and fullness in Douglas pouch and large tender ovaries. The asthenopia and reflexes improved, and the flickering and photopsies cleared on lying up and treatment with hot douches and subsequent reposition of the uterus. This was twelve months ago, and the symptoms recurred on her return to her husband and hard work. She has again improved, leading a single life, and resting.

(xvii, 38.) Mrs. S., aged thirty-five. Seldom reads, because of the distress it causes to her left eye, which has ached almost constantly for a long time past. Discs hyperoemic. H + 0·5 o.u. all manifest o.u. $\frac{6}{6}$ + 0·5. Left reflex. Dr. Batchelor reports left ovary cystic.

These five cases may be taken as typical of the group of ovarian asthenopia due to disease, and I do not propose to weary you with further examples, but will outline a few cases of ovarian asthenopia from functional causes.

(viii, 271.) Aged twenty-five; healthy. Married two years. Asthenopia dating back about same time. About 0·75DH in each eye all manifest V = $\frac{6}{6}$ + 0·75, discs hyperoemic, reflexes and ovarian tenderness. Precautions ever since marriage. Said that she and her husband were very attached, but did not want children. I told her the cause of her discomfort; and when I met the lady after an interval of over twenty years she was getting on for fifty, healthy, happy, and much wrapped up in her children. I noticed that she was reading without glasses, and with no sign of effort.

(ii, 289.) Had some accommodative spasm, accompanied by headache, as result of over-use of eyes, which yielded to atropine and reading-glasses. The following year she married, and had gradually increasing asthenopia and headaches, culminating after about two years in occasional failures of vision for reading and some giddiness. The discs were very hyperoemic, the retinal veins tortuous, and the retina hazy in both eyes, especially the right. Reflexes. Sent to Dr. Batchelor, who found an imperforate hymen and much ovarian tenderness. The hymen was then divided, and the ovarian irritation soon cleared, the fundi were practically normal, and there has not since been any return of the irritability of the nerves or of the asthenopia over a period of twenty-five years.

(xii, 243.) Aged twenty-five. Came with sluggish iritis, starting with suppressed period, due to wet feet. Discs red and hazy. Aggravation of symptoms without apparent cause, while she was in town under treatment, was noticed to coincide with her husband's visits. After recovery from the iritis pupil-reflexes were found. Asthenopia and weakness of eyes lasted for some time, when it was elicited that connubial relations were unsatisfactory to her owing to preventive measures, and it was definitely stated that unsatisfactory coitus was followed by much ocular distress, a phenomenon I have come across in a good many cases. Abandonment of precautions was followed by improvement of the eyes and lessening of the reflexes, and cure followed a couple of pregnancies. The children are now quite grown up, and have been patients of mine, so that I have had opportunities of seeing the mother and getting reports from time to time of her continued good health.

(xviii, 128.) Aged thirty-two. Has been a teacher, and nervy. Increasing asthenopia worse at periods, and increasing right iliac pain which had led to a suggestion of exploring the appendix. The symptoms dated back six months. Discs irritable. Reflexes. Questioning elicited that she was six months married, and her husband shared her bed, but that they held views on eugenics, and thought they were not ideally robust parents, and the marriage had never been consummated, though she admitted at times they found it difficult to live up to their views.

M. T., aged twenty-seven ; teacher. Asthenopia ; worse at periods. Discs very irritable. Reflexes. Given tonic and glasses. Three months later eyes were easier and reflexes gone. Five years later she came about something else, and then stated that she had known all along that the asthenopia was due to ungratified desire, and was always worse after the visits of a certain man. She had not seen him between her two visits to me, and attributed the improvement to this fact. She became so bad later that after one visit she could not face daylight. Four days later, at his next visit, she became pregnant, and the eyes ceased to trouble her. Since birth of child (three and a half years before she made the statement) she had lived a single life, and her eyes had given her no trouble.

(ix, 205.) Aged twenty-three. Serious asthenopia ; intolerance of light, and eyes constantly bloodshot. Discs red and very soft in outline. Reflexes. Masturbation since age of nine.

(vii, 8.) Headaches, asthenopia, and intolerance in woman of twenty-seven. Retinal veins full and discs hyperoemic. Reflexes. Bad nervous family history. Masturbation from age of eight.

M. R., aged about twenty-five. Troublesome asthenopia, dysmenorrhoea, retinal congestion, and very irritable nerves ; marked reflexes. Temporary relief from reading-glasses and bromides. On a relapse after stopping the bromides I asked her if she knew any cause which aggravated the eye symptoms, and received the candid reply, " I expect it will go on till I get married ; my sister was just the same till she got married."

I have taken these cases almost at hazard from a long list, and could easily multiply equally marked instances if they were needed. The histories of the cases differ—prolonged or broken engagements, unfortunate love affairs and entanglements, masturbation in unmarried women, and in married women preventive measures; but they are all alike in the presence of the reflex and the existence of ovarian irritation.

In consequence of the very wide spread of education here it is difficult to estimate how much of the nervous irritability in these cases is directly attributable to the stress of school-work at the age of puberty, but one can say with confidence that the class which is not educated beyond the Sixth Standard is not the class in which ovarian irritation is associated with evidence of such lack of nerve-force as to cause asthenopia and render small degrees of hypermetropia manifest.

In looking through my notes I dropped on a case of asthenopia and reflexes in a girl who for five years started practising the piano at five each morning, after breakfast went twelve miles by rail to the district high school, getting home again by rail about six in the evening, and after her meal doing three hours' home-lessons. In such a case there is no wonder that her nervous balance was not sufficiently stable to keep the ovarian function in due co-ordination with the rest of the organism; the wonder is that she had not broken down altogether. In this connection I wish to say again what I have on several occasions said before—that while the strain of our educational system on growing girls does great harm to many of them, the additional strain of preparation for musical examinations is disastrous in its results, and should not be permitted.

To return, however, to the reflex, I think I may perhaps best show how it may help us in forming a true estimate of the real nature of our cases by quoting the outline of one more typical case.

Mrs. M., aged twenty-seven. Sent to me with a bad prognosis as a case of specific retinitis, with marked contraction of the fields of vision. As well as I remember, charts of the fields were sent. There was no direct specific history, but the letter she brought stated she had a "ricketty reputation." The retinal veins were full and tortuous, and the discs very irritable. The vision was $\frac{6}{60}$ R. and $\frac{6}{36}$ L. Refraction practically emmetropic, and she did not walk as if her fields were defective. She had marked reflexes, and careful charting of the fields gave a much contracted and typically spiral field in each eye. I sent her to Dr. Batchelor, who found enlarged and very tender ovaries, and elicited a history of increasing dyspareunia, dating back for some years. The poor woman's "ricketty reputation" probably was due to misguided views as to powdering her nose, and it is quite possible that she took to doing so to hide a circulatory disturbance of pelvic origin. I sent the patient back with advice to have the pelvic condition treated instead of the eyes, and feel sure that the advice was sound.

One is tempted to quote vitreous haemorrhages vicarious of menstruation and other interesting cases, but I feel that I have already exceeded the length of time I am entitled to claim, and think that I may have said enough to arouse your interest in what has proved to me a very useful symptom. I have not rushed hastily into print about it, but have waited to be quite certain I was on sure ground. If you look for the symptom you will get it in some patients about the periods, and not at other times; in some patients you will get it at all times. If you get unexplainable asthenopia and the reflex you may fail to get to the bottom of the case; but my observations lead me to feel sure that there is ovarian irritation present, and that treatment with glasses alone will not prove satisfactory either to the surgeon or the patient.

I based my former paper on thirty-five cases; if necessary I suppose I could now readily find records of a couple of hundred, but there is no need to do so, as I feel sure you will all find cases for yourselves if you look for them. I cannot conclude better than by quoting the last paragraph of my earlier paper: Mr. Power says in his lecture, "The occurrence of a reflex action between the ovary and the eye, though in itself highly probable, is difficult to establish, because there are so many contingencies, and the path through which the noxious influence travels is difficult to trace." If, as I believe, this pupil-reflex is a reliable clue in even a percentage of patients it may afford help in many cases where it is much needed.

THE QUESTION OF THE REGISTERED OPTICIAN.

By Leonard J. C. Mitchell, M.B., B.S.,

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[*Kindly read by Dr. J. W. Barrett, C.M.G.*]

Mr. President and gentlemen,—During the last few months we have seen in Victoria the beginnings of the movement on the part of the opticians for registration as sight-testers. This has been strongly opposed by the Eye and Ear Section of the Victorian Branch of the British Medical Association, as we felt we owed it as a duty to the public.

Though new in this part of the world, a similar movement is going on throughout English-speaking countries, and in the United States of America the opticians have triumphed. However, let it be borne in mind that medical education there is for the most part of a much lower standard than in British lands, and in America the optician has been a great power for many years. We do not forget America's brilliant medical men in all branches of the art, nor that in spectacle-making the American houses lead the world. Be that as it may, the average practitioner in medicine in the Empire is far better equipped in every way than is his American cousin. It follows, therefore, that the better-trained wholesale spectacle-maker should foster a new hybrid type of "consulting optician," or person with similar pretentious title, who claims to be able to refract in most cases, and to be able, without mydriatics, to pick out diseased eyes from healthy eyes.

The Victorian Optical Association consists of a few large firms, and a large number of the jeweller-optician and chemist-optician type of men, who are united into this organization for various purposes—such as raising the status of its members, protecting their interests as well as those of the general public, and elevating the standard of optical education among its members. It will be noted that the majority of the big firms, whose members possess for the most part high optical qualifications, refrain from joining the association.

This association early in 1913, without any word to the oculists, drafted a "Bill for the Registration of Sight-testing Opticians," and waited on the Acting-Premier, Mr. Murray, and won his support for the Bill. A deputation consisting of practically every oculist in Melbourne, and of representatives of the optical firms not in the V.O.A., waited on Mr. Murray soon after, and brought forward arguments against the principle of the Bill. Mr. Murray seemed little impressed with the case as presented by the oculists, and in a humorous vein he waved them all aside, and justified the principle in question by arguing from his own case—in which he had to his own satisfaction bought his presbyopic correction over a shop-counter! However, he suggested a conference, and after much correspondence this took place, but naturally ended in an *impasse*—the opticians stoutly maintaining that they could refract the great majority of cases, and could pick out all cases of disease and send them on to the oculist. On the other hand, the oculists repeatedly pointed out that it was utterly beyond the limited qualifications of opticians to do this. Our arguments were of the type calculated to appeal to men with presumably some knowledge of the eye as an *optical instrument* at least, but they failed to convince the opticians. Then followed some lobbying, and the issue of a pamphlet by the Eye and Ear Section of the Victorian Branch of the B.M.A., and this was sent to members of both Houses. It called forth a parallel column effusion from the opticians, and this will be referred to later. Suffice it to say that when Mr. Murray introduced the Bill he was met by hostile gibes from all parts of the House. No discussion followed, and later, after the political crisis, the Watt Ministry discharged the Bill, along with many others, from the Notice Paper.

Here a note of warning must be sounded—this is not the end of the matter. In Victoria, in the other States, and in New Zealand similar Bills will be introduced, and the fight must continue. As indication of this, let us remember that an Opticians Registration Bill has been passed in Tasmania, and the jeweller-optician and chemist-optician type is openly rejoicing that "they are as good as the best of them," able to charge fees and recover them! This is, of course, the natural result of legislation of this character, as such new laws must include all at that trade at the time of enactment. But surely this spirit is an indication that there are other motives at work than the ones referred to above.

Dr. Casey Wood, of Chicago, summarized the position in America in a striking article in the Practical Medicine Series, and some of his points are worthy of our earnest consideration. He states that "ophthalmology is recognized as an important branch of medical science; also that the rise of 'optometry' and the popular demand for refraction, apart from a knowledge of medicine, is a tendency to be deplored. Yet it is a difficulty to be recognized and met, and how better than by furnishing ample opportunity for medical graduates to obtain special education in ophthalmology, giving adequate opportunities for getting the necessary knowledge and skill." The time spent in such work should in no instance be less than a year and a half. Some knowledge of general medicine and surgery in private practice forms the best foundation for such post-graduate study of the eye.

The refraction of the eye, while forming a large proportion of the actual practice of ophthalmology, is, as we are well aware, a mere item in the study of the eye. But this very fact is as difficult to impress on the public mind as is the corollary—that to treat errors of refraction apart from the whole condition of eye and patient is utterly unscientific. To quote Casey Wood again : " Opticians, seeing in the fitting of glasses a large and important field in ophthalmic practice inadequately provided for, have attempted to seize the opportunity for themselves. One of their leaders, who formulated the striking statement 'A lens is not a pill,' later stated that he believed the public would be best served by practitioners who should have qualified in optics and in medicine." However, he elaborated this statement later, and brought it into line with that of the Secretary of the Optical Society of the State of New York. Both these writers state clearly that such " qualification in optics and medicine " should consist of two years' optometry and one year of medicine. Thus the American opticians may be fairly said to be aiming at a new class of man, who is *to care for the eyes in their entirety*. This being the case, it behoves us, in the interests of our fellow-citizens, to use every effort to combat the beginnings of all such movements as may lead to such an end.

Arguments used in the Victorian Controversy.

(1.) Drugs in the Estimation of Refraction.

It has only to be mentioned that the extensive use of mydriatics is necessary for accurate refraction in children, and is of great use in the majority of other cases, both for refraction and to render the examination of the fundus oculi efficient. However, our opticians who do not read standard text-books on ophthalmology are content to quote from " Alger on Refraction," and to half-read his remark which they have the temerity to print—namely, " The physician who has fallen into the habit of always using a cycloplegic is utterly lost when it comes to an examination of the eye when the pupil is small and the accommodation active, and thinks every one else must be equally at sea, while, as a matter of fact, an experienced man using care and judgment will *in suitable cases* reach the same result with or without a mydriatic."

You will note the qualification included in this statement, yet this is brought forward as an adequate reply to our contentions. Opticians also state the opinion of a medical man who is quite won over to optometry in preference to refraction ; but those of you who have used or studied the keratometer, or similar instrument, know that such instruments measure the corneal astigmatism and not the total astigmatism.

(2.) Sight-testing and Disease.

It was pointed out that opticians, in spite of their present training in the knowledge of disease, could not discriminate between those which required medical treatment and those which did not. The opticians asserted that they daily picked out cases of disease and sent them to the oculist. But who amongst you has not records of a score of cases of glaucoma, early cataract, choroido-retinitis, progressive myopia, or other disease, which cases have been sent on when it is too late to do much good. Since taking up these arguments a large number of cases has been reported to me bearing out this; and only a week ago I had a patient who had been under a leading optician in Melbourne for nine months, and had had four changes of glasses. The condition was double chronic glaucoma with fair central vision in one eye only, but with tubular fields of vision. This patient's chance of good peripheral vision is, you will admit, very remote. (We have refrained from putting forward this class of evidence, feeling it would serve no good purpose. Dr. Halliday's cases in the Aust. Med. Gazette, 26th October, 1912, are as striking as any could be.)

In this connection the opticians dragged in Sir Henry Swanzy. In his "Students' Hand-book" he sounds a note of warning as to the possible consequences of the random use of atropine by *general practitioners.* This statement is brought forward as a danger which besets the drug-employing *oculist!*

(3.) Optical Parlours.

The methods of some opticians in using very undignified advertisements and other questionable methods were pointed out, but the checking of such methods was not suggested by the other side.

(4.) The Sphere of Sight-testing.

Oculists insisted that opticians could not claim to be generally competent to test eyesight in the sense of determining the causes of defects of sight, apart from refractive errors pure and simple, and hence even treatment by glasses was essentially the work of an oculist, and was outside the optician's competence. To rebut this point, the opticians brought forward the historical argument that treatment by spectacles had been the sphere of the optician for six hundred years, and had been adopted by the medical profession at a comparatively recent date. To push this argument to its logical conclusion, we should surely advise our optician friends to consult a clergyman for a broken leg—for were not the clergy the physicians, even in the Middle Ages?

(5.) Exclusion of the Unqualified.

The Bill in question, being on the same lines as other optical Bills, gave greater protection to registered opticians than did the Medical or Dental Acts, and we maintained it was not British justice to prevent the unqualified from practising.

(6.) Qualifications Necessary for Sight-testing.

We pointed out that the mechanical process of sight-testing could be quickly acquired and correctly applied by a man of very humble attainments, and such a man was just as likely to be correct as was the highly trained scientific optician. Hence he should be at liberty to practise if the public chose to employ him. In denying this, it will be seen that again the opticians showed that they failed to appreciate the difference between *sight-testing* and *prescribing glasses.*

(7.) Close Corporations.

The Victorian Bill really proposed to create a close corporation of opticians, who might keep to themselves a very lucrative trade under the specious plea that it was a highly skilled profession. This was shown by the clauses in the draft Bill which dealt with the Opticians Registration Board. This Board was to consist of the opticians themselves, and the Board's duties included drawing up a curriculum and conducting examinations. The opticians later expressed their willingness to add two nominees of higher educational bodies to the Board, but it will be noted that in the Bill which was put before the House the opticians still had a safe majority.

Conclusions.

Whilst fully alive to the harm done by the itinerant spectacle-vendor, we do not see with the opticians that the cure for this is the registering of "sight-testing opticians," but we maintain that the registration of "spectacle-makers" would do this most effectively. We object to the *legal recognition* of sight-testing by opticians, because we believe that it is outside their competence, for the reasons aforementioned—that the eye is part of the body, and not an optical instrument.

A Bill was introduced into the House of Lords some years ago in order to press for the same principle; but it was defeated in the introductory stages by the combined activity of the British Medical Association and the Ophthalmological Society of the United Kingdom.

At the same time, oculists are well aware that they are not infallible, any more than members of other professions; but we do affirm that we are fully capable of giving a decided opinion in this case; and, considering the training of opticians, we are not surprised that they fail utterly to grasp the significance of our arguments. We do not fear the competition of the opticians, for we are all convinced that whatever legislation is carried it will make no difference to our *clientèle*. We wish, as heretofore, that the public choose between the oculist and the optician; and we further realize that it is physically impossible for the present limited number of oculists to attend to the needs of the spectacle-wearing public.

I quote from a striking leader in the Melbourne *Age:* "Assuming both oculist and optician to be fully qualified in their respective spheres, are they equally capable of testing the sight of patients? It is proposed to ask Parliament to say that they are."

SECTION OF DERMATOLOGY, RADIOLOGY, AND MEDICAL ELECTRICITY.

NOTES ON THE RONTGEN RAYS AND RADIUM.—PRESIDENTIAL ADDRESS.

A DIGEST OF SIXTEEN YEARS' EXPERIENCE, EMBRACING OVER THIRTY THOUSAND CASES.

By Herschel Harris, M.B., Ch.M.,

President of the Section of Dermatology and Radiology; Late Assistant Surgeon, Sydney Hospital; Hon. Radiographer, Royal Prince Alfred Hospital; Hon. Radiographer, Sydney Hospital; Hon. Radiographer, Royal Alexandra Hospital for Children; Hon. Radiographer, Western Suburbs Cottage Hospital; Hon. Radiographer, Free Tuberculosis Dispensaries, &c.

Ladies and gentlemen,—In the first place, I wish to take this opportunity of thanking Congress for the great distinction that has been conferred upon me in electing me to the presidency of this combined section.

The selection of a suitable subject for my paper has been a matter of considerable difficulty, because previous Presidents have so exhaustively dealt with matters appertaining to this section. After mature consideration, realizing that during the past sixteen years well over thirty thousand cases in private and hospital practice have passed through my hands treated with the X-rays and radium, I have decided to relate what I consider to be the salient points, including the methods employed, and as far as possible the general results obtained.

The Rontgen Rays.

As the X-ray department, together with its equipment, at the Royal Prince Alfred Hospital is certainly the most complete in New South Wales, and probably the best in Australasia, a brief description of it will not be out of place

The current is an alternating one, and it has been transformed by means of two Siemen's motor-generator sets. The sets each consist of a three-phase squirrel-cage inductor motor, mounted upon the same cast-iron bedplate with and directly coupled to a compound wound direct current-generator. All the bearings are ring-lubricated, thus requiring no attention whilst running. The motors, which are each of 13-brake horse-power capacity, take three-phase current from the City Council's mains at 415 volts 50 cycles, and drive the generators at approximately 1,430 revolutions per minute. The generators are each rated to develop 7·5 kilowatts as a normal full load at 240 volts (*i.e.*, 31 amperes at 240 volts), and are capable of an overload of 25 per cent. for half an hour or of 50 per cent. momentarily.

The supply of current to the motors and from the generators is controlled by a two-panel switchboard of white Sicilian marble mounted upon an angle-iron framework. The motor-panel is equipped with three fuses and one triple-pole switch for each motor. The generator-panel is equipped with pilot-light, fuses, voltmeter, ammeters, double-pole switches, and shunt field-regulators for each generator. The auto-transformer starters for the three-phase motors are placed on the floor immediately below the switch-panels, so as to be easily accessible for starting and stopping the sets. The whole of this apparatus is placed in a separate machine-room, into which is led the three-phase service from the City Council, and from this machine-room direct-current 240-volt leads go to the switchboards in the radiographic and therapeutic rooms.

The large radiographic room contains a group of apparatus specially made by Schall.

The coil is of the heavy discharge variety, giving 16 in. spark, with a variable primary to work on a 240-volt current. There is a four-anode electrolytic brake consisting of three Caldwell and one Wehnelt anodes. The three Caldwell anodes are used in series for instantaneous exposures and the single anodes for longer ones. Also, there is a Record mercury brake for ordinary work.

The switchboard is specially arranged in the most convenient manner for all purposes, giving complete control over either electrolytic or mercury brake. Attached to it are an automatic double-pole switch and clockwork time-regulator.

There is a special variable primary regulator which controls the coil with the utmost simplicity, a current-reverser, an interrupter-selector, a shunt-switch, an ammeter, and a voltmeter, with all necessary fuses.

The stand is that of Béclère, specially made to allow of a bedstead passing through it. This I consider to be the best stand on the market, combining as it does universal movements together with excellent compression.

Without exception, all radiographic work is carried out in this room, as the apparatus is a fixture. If necessary, the patients are conveyed there on their beds.

For viewing negatives there is a special view-box, the illumination of which is controlled by a rheostat.

The tubes in use are mainly the large water-cooled ones of Müller, and the "moment" tubes by the same maker. One of these tubes has taken over three thousand cases, and is still "working a treat." All the latest protective devices are in use.

The large transformer-room is used as a dressing-room for patients if necessary. There is a large developing-room, and another room with a special outfit for therapeutic work.

Lastly, there is a spacious and well lighted and ventilated office for the use of the medical officers connected with the department. In this room all the records are kept. The plates are grouped in separate compartments, and the cases, both therapeutic and radiographic, are kept according to the card system. Over three thousand cases passed through this department last year, and the Resident Radiographer together with his lay assistant are kept continuously at work all day long.

Frequently members of the staff visit the department to see their cases screened, and the various cases are always followed up, as by this means results are constantly being improved upon from the information thus gained.

The Directors of the Royal Prince Alfred Hospital have not adopted a cheeseparing policy, consequently they have a well-equipped department, and the results fully justify the expenditure. The work performed in this department has necessarily been of a most varied type, and a great deal of it is experimental. Naturally, it is all of a most interesting nature.

The special method of X-ray examination has shown such remarkable powers for evil as well as good, and it requires such a high degree of specialization both in the apparatus and the operator, that it is now left to selected members of the profession who dabble in this art and each day render more and more valued assistance.

Just like tuberculin, salvarsan, the cystoscope, and other new weapons placed in our hands to combat disease, so the X-rays must be regarded as a two-edged weapon. We must learn to use it, to see that we do not inflict direct injury by the instrument itself or draw wrong conclusions from its use which will lead us on to other steps detrimental to our patients.

Some of the pictures produced are so simple and straightforward that he who runs may read. Others need not only good anatomical and pathological knowledge, but real experience in particular regions and in particular diseases. Here let me mention that I agree with Professor Schönberg, who states that the Röntgenologist is a medical specialist and all Röntgen plates, prints, tracings, and other documents which he may prepare are his sole property.

Above all, let it be remembered that the possession of so valuable a servant as radiography is no excuse for the omission of other and simpler methods of examination, any more than the use of the cystoscope is a substitute for full investigation of the urine.

Again, the presence of a foreign body revealed by the X-rays, or some pathological change observed in a bone or elsewhere, are not reasons for operative interference. Gilbert Barling, in a recent number of the *Archives of the Röntgen Ray*, lays special emphasis on this point. This lesson has been learnt by the senior surgeons regarding such things as bullets and similar objects buried in the tissues, but there is always a tendency for the aspiring surgeon to make an attempt to remove and produce the foreigner. One can picture hundreds of cases walking about with bullets of varying sizes embedded in different parts of their anatomy without the least inconvenience being produced. Regarding fractures, it is generally conceded that every case should be submitted to radiography.

The radiographer should take a radiogram of each case in preference to screening. On many occasions has a fracture been missed by screening alone. Then, again, an antero-posterior and lateral view should be taken in each case. How often does it happen that a fracture appears in one plane and not in another ? It is also practically impossible to decide on the position of the fragments without this double view.

If the patient be dissuaded from seeking the help of the X-rays, and the final result of the treatment is not satisfactory, he has a grievance against us, and if the case should be carried into a Court of law Judge and jury are apt to take the view that the doctor has been guilty of negligence. Very many cases that were and still are looked upon as sprains are now found to be sprain-fractures, and frequently a clear picture will reveal a split in the bone in the vicinity of the sprain. The commonest fractures are those about the ankle and wrist ; and about these a few hints may be given with advantage.

The prolific use of the X-rays in recent years has forced more attention to the anatomical reduction of fractures, which is a worthy ambition, but our appreciation of functional reduction has been obtunded thereby. Our interpretation has forced undue regard to the reduction of fragments rather than the correct estimation of the position of functional joint-surfaces. Pott's and Colles's fractures may be singled out for special mention.

Fractures at the Ankle.

Axiom.—The functional result of an ankle-fracture depends upon the proper reduction of the astragalus, so that the line of weight-bearing force, which passes through the centre of the tibia, also passes through the astragalus at its centre. The secret of the correction of this fracture lies in the proper adaptation of the astragalus to the tibia.

A line drawn through the centre of the tibia extends through the centre of the astragalus. This line may be charted upon the antero-posterior X-ray plate by applying a line to the centre of the tibial shaft and extending it downwards through the shadow of the astragalus.

This vertical line should always extend through the centre of the astragalus if the ankle-joint is in a normal position.

Fractures at the Wrist.

Axiom.—The styloid process, not just the tip of the radius, is constantly distal to the line which touches the tip of the ulnar styloid, which line is at a right angle to the longitudinal axis of the radius.

The functional result of fractures of the radial base depends upon its reduction to this position. In the normal extended hand the long axis through the centre of the radial shaft passes between the proximal epiphyses of the second and third metacarpal bones. In backward displacements of the radial base, the radial rotation of the carpal area and metacarpals usually bring this line between the third and fourth metacarpals. But this single line is not sufficient to judge the radial position from the single antero-posterior X-ray negative. So we must add the line at right angles to this longitudinal axis of the radius at a point corresponding to the tip of the ulnar styloid. If the styloid of the fractured radial base is behind this line it is not properly reduced, and if left in this position, then will remain a functionally imperfect wrist. In the adult male the length of ulnar styloid that should be distal to this transverse line should be at least $\frac{3}{8}$ in.

In a recent number of the *American Quarterly of Röntgenology* Dr. E. H. Skinner deals elaborately with these points.

Cases of bone-tuberculosis are frequent, and in the early stages difficult to detect by radiography. The typical picture is due to the bone-atrophy caused by the disappearance of the lime salts. An early tubercular joint may not reveal any abnormality in the Röntgen plate, whereas another plate taken a month or two later may reveal very marked changes—viz., atrophy shown by increased radiability and a general fuzziness. Later, sequestra may be seen. These cases must not be confused with syphilitic bone-lesions, when the bones are not translucent but rather porous, and we have the dense shadows of the periosteum and cortex with at times partial obliteration of the medullary cavity. These thickenings are sometimes found in the later stages of tuberculosis, especially when the shaft is involved.

A very true statement has been made—namely, that disappointment in photographic result means tubercle, brilliancy in contrast osteoarthritis, and gross irregularity in the substance of a bony growth means malignancy.

Sarcomata of bone are generally easy to diagnose, and are fairly frequent. Over fifty cases have been met with at various times. The endosteal ones are so typical that they should not be missed ; the obviously rapid expansion of the overlying bony shell is apparent, and cannot be mistaken for an inflammatory condition. Always suspect sarcoma when a case of spontaneous fracture occurs, being mindful at the time of hydatid.

Many well-marked cases of osteitis deformans have been met with showing distinctive signs of bone-absorption with bone-hypertrophy and consequent bending.

Coxa vara is comparatively rare, only three cases having been found ; likewise achondroplasia ; whereas congenital dislocated hips are frequent.

When raying these cases with the plaster casing on, a good plan is to carefully remove a window anterior to the joint. This can be filled in subsequently.

Cervical ribs are not uncommon. From the symptoms of pressure on nerves the presence of these supernumerary ribs may be inferred, but only by the use of radiography can they be definitely recognized when they are small. Often the small rib will produce nerve symptoms of greater severity than the larger one, owing to a hook-like process at the extremity of the small rib curving down on to the nerve-trunk. It is quite an ordinary circumstance to come across a case of spur of the os calcis, either single or bilateral. Males generally are affected. Sometimes, too, osseous excrescences are detected on the posterior part of the os calcis.

One of the most interesting lesions is myositis ossificans. Sometimes the involvement is great, at others it is limited. Often a lesion in the adjacent bone is discovered.

Much useful information has been gleaned by radiographing the sinuses of the head. At the same time, a very large number of cases must be taken to obtain reliable data for interpretation.

Radiography of the Renal Tract.

Whilst the most useful and interesting branch of radiography, it is at the same time the most difficult. Always remember : *Radiograph the whole tract.* This rule is infallible, and most mistakes are made by not following it. Remember : *Radiograph the whole tract.*

Frequently stones are found in the kidney and bladder of the same case, or in both kidneys, or, as recently happened, in the kidney, ureter, and bladder of the same case, with symptoms of a very vague nature. Phleboliths are the bugbear of the radiologist.

Catheterization of the ureters will frequently assist in a doubtful case, and these two methods should be looked upon as handmaidens.

Fortunately, most calculi contain calcium salts, otherwise few calculi would be detected. Those few calculi composed of cystine, and others containing uric acid and urates, are transradiant. Remember that occasionally a rib may overlap the shadow of a renal calculus. It is quite surprising the number of calculus cases that exist in New South Wales. Without exaggeration, one can safely say, on an average one case a day is discovered, in one's own experience the total to date being well over a thousand. Many of these would be overlooked if the whole tract had not been rayed. No doubt, too, the success is mainly due to the methods employed.

Two plates are sufficient for the whole tract. The first one takes in both kidneys and upper ureters, the second one the lower ureters and bladder. The Béclère compressor is always employed. In doubtful cases several exposures are made. The patient should be prepared beforehand. It must be remembered that certain calculi tend to recur, especially phosphatic ones. Also it must be remembered that in some cases, especially those of branching calculi, small fragments occasionally are left behind; so try and discriminate between stray fragments and recurrences. This, of course, is best done by raying the case after the operation if any doubt exists.

Frequently the surgeon will consult the Röntgenologist as to the procedure in calculus cases. Herein lies the advantage of the Röntgenologist being present at the operation.

The method of approaching the calculus should be suggested if the operating surgeon so request, and often one's opinion is sought as to the advisability of operating at all in certain ureteric calculi. Many ureteric calculi, even moderately large ones, will pass on without operative interference. If frequent and very painful attacks of colic occur, undoubtedly an operation should be performed.

Operative procedure cannot be touched upon, but one point that may be mentioned is that when the calculus is lodged in the lower end of the ureter, by careful manipulation it can generally be coaxed backwards some distance, and so enable its removal with more ease. Quite recently a ureteric calculus the size of a small hen's egg was discovered in the lower end of the ureter. Even this one was coaxed backwards some little distance. It may be also mentioned that needling a kidney in search of a calculus is not always successful, as mistakes have frequently been made in the putty-like stones—the phosphatic ones.

Palpation too frequently leads to errors being made, and in doubtful cases the only satisfactory procedure is to open the kidney and explore the calices.

Ureteric calculi, when in the lower part of the ureter, may be overlooked, owing to the shadow of the stone overlapping that of the subjacent bony structure. Directing the rays at an oblique angle will sometimes cast the shadow of a calculus to the side of the bony structure.

Recently some beautiful results have been obtained in radiography, some specimens of which are being exhibited. This method has opened up a new field of usefulness in radiography of the urinary tract.

For gall-stones, not much reliance must be placed on Röntgenography at present. Three well-marked positive results have been found and proved subsequently by operation. Cholesterine stones almost invariably contain some pigment—usually calcium carbonate and phosphate. When these salts are present in sufficient quantity it is possible to obtain plates showing their shadows, but these must be differentiated from kidney-stones and other things—*e.g.*, calcareous glands, which may also cast shadows in the same regions.

Examination of the Thorax.

In his presidential address before the Röntgen Society in 1899, Mr. Mansell Moullin said, "I am convinced that at no very distant date the examination of a patient's chest with X-rays will be considered as much a matter of routine and as little to be neglected in all doubtful cases as an examination with the stethoscope at the present time." This prediction has come to pass, and many a blunder has been made through a screen examination of the thorax not being recommended, either due to forgetfulness on the part of the medical attendant or ignorance that such valuable aid was obtainable.

Hydatid Disease of Lungs.

Hydatid disease of the lungs is of common occurrence, and must always be suspected if a patient gives a history of haemoptysis with negative tubercular tests. It should always be remembered that intact cysts are globular ; ruptured cysts present MacCormick's sign—that is, the shape of a Dutch cheese with the top sliced off, and as the patient is tilted from side to side the upper level remains horizontal ; and collapsed cysts present a hazy crinkled appearance.

Several cases have exhibited all the signs and symptoms of phthisis with negative tubercular tests, and when examined with the screen have presented a small hazy patch. Subsequently small endocysts have been coughed up. Apparently these have been very thin-walled cysts, with a small irregular area of condensation around them corresponding to the density of the cyst itself. One must always be on the look-out for such cases.

Aneurisms are acknowledged generally to be readily seen with the screen, and it may be asserted with all assurance that this condition is diagnosed more easily and with greater certainty by this method than by any other.

Sometimes mediastinal growths confuse the screen picture, especially when their shadows fuse with that of the heart. By carefully manipulating the patient and turning from one angle to another, some differentiation may be detected, and so clear up the diagnosis.

Lymphosarcoma, it must be remembered, is constantly met with, and as the termination in these cases is usually rapid, a definite diagnosis is very essential.

Pulmonary Tuberculosis.

The law just formulated by Louis that "tubercles develop first in the apices of the lungs, and are always of older standing there than at the base," still embodies for most physicians a sort of clinical axiom. We must not, however, confuse the two ideas—"initial lesions" and "initial physical signs."

The seat of the initial physical signs does not necessarily correspond with that of the initial lesions. It is thought by many competent observers now that the apical infection is secondary to a primary hilus affection in very many cases, and that this apical involvement is due to auto-inoculation. The physical signs, however, are generally more easily discoverable near the apex, due to anatomical conditions.

Radioscopy and radiography, while they do not as a rule enable us to detect germinating lesions, do reveal circumscribed conglomerated or excavated lesions seated in the centre of the lobes or elsewhere. On the contrary, auscultation alone will enable us to detect the physical, very discrete signs that characterize tuberculization of the apex at its onset.

For some considerable time it has been recognized that the hilus or root of the lung is a common site for tuberculous deposit, more particularly in connection with the trachea-bronchial lymphatic glands, but the immense importance of the hilus as an early and primary focus of disease is only just beginning to be appreciated.

The frequency with which the lymphatic glands situated close to the bifurcation of the trachea become affected may be readily understood when we recall the fact that these glands are the natural filters to which pass foreign particles, including tubercle bacilli, originally deposited on the bronchial mucous membrane in the act of inhalation or in the alveolar tissue of the lungs, whether orginally conveyed there by aspiration or blood-infection.

A thorough knowledge of the intra-pulmonary and extra-pulmonary lymphatic drainage-system explains how the bronchial glands become involved, and how the disease extends and disseminates. It must also be remembered that there is direct communication between the lymphatic system of the thorax and that of the neck and abdomen.

Nargeli, the well-known pathologist, found evidence of tuberculosis in no less than 97 per cent. of all adult post-mortem examinations, and in a large proportion of these the disease took the form of calcareous or caseous deposits in the bronchial glands situated either at the roots of the lungs or along the large air-tubes.

Hamburger and Monti, in Vienna, indicated that over 50 per cent. of school-children under six and 94 per cent. under fourteen had already become infected with tuberculosis, and the disease affected mainly the lymphatic glands at the roots of the lungs and elsewhere.

We may truly deduct from these observations that "Civilization means tuberculization." Fortunately, however, there is a marked tendency to spontaneous cure in the case of glandular tuberculosis.

When radiographing these cases the patient should be made to hold his breath during the exposure, and when screening the hilus a lateral oblique examination should always be made. If much enlarged they may cause a marked increase of the normal median opaque area, and may simulate aortic aneurism. This applies generally to enlarged mediastinal glands.

Well-marked hilus shadows, especially if they extend well outside the root area in conjunction with a positive tuberculin test, are indicative of tuberculous disease.

The early restricted movement of the diaphragm, so often seen in early tuberculosis, may, as Murray Leslie, of London, points out in an able article in the *Clinical Journal*, be due to hilus disease restricting the air-entry. No doubt the majority of these hilus cases are cured naturally; the minority later on manifest tuberculous disease.

It has been pointed out that asthma in children is frequently due to reflex or direct irritation from enlarged bronchial glands and peribronchial thickening and infiltration. In all instances where deep-seated disease is suspected recourse should be had to radiography, which is by far the most important and often the only method of diagnosing hilus and peri-hilus tuberculosis. Indeed, it is practically impossible to form any adequate opinion of the extent of central disease apart from X-ray examination.

It is generally admitted that it should be made a definite rule for all children and young adults who manifest the symptoms of persistent bronchial catarrh or asthma, particularly if accompanied by anaemia, lassitude, and other signs of failing health, to be submitted without delay to an X-ray examination.

Too much importance cannot be placed on hilus and peri-hilus disease, and the early recognition of it will assuredly greatly assist in the treatment of pulmonary tuberculosis.

In most chest cases radiography should be combined with fluoroscopy, because by this means a permanent record is made for future comparison; the patient and operator are exposed to less risk by an instantaneous exposure than to a prolonged fluoroscopic examination; and a positive finding will serve to impress the patient with the importance of necessary treatment.

The Bismuth Meal.

This is one of the most interesting, valuable, and difficult subjects that come under the notice of the Röntgenologist. By this means most valuable data are obtainable, providing great care be exercised in every detail. It is often very difficult to differentiate the normal from the abnormal, but with a thorough grasp of the anamnesis, of alimentary physiology, and of that difficult attitude which the gastro-enterologist must maintain toward the question of functional disturbances, and sometimes in co-operation with the clinician, intricate cases are often unravelled.

Technique.

Bismuth oxychloride is always employed, either in capsules or mixed with arrowroot. It is always advisable to flavour the mixture, otherwise it may be distasteful to the patient, and cause an inhibitory effect on the part under examination.

It has frequently been observed that an unflavoured meal may lay for hours in the normal stomach, with the peristaltic action in abeyance as a consequence. Vanilla flavouring is generally agreeable, and a few drops of the essence are added to a 10 oz. mixture of arrowroot of a moderately thick consistence well mixed with 2 oz. of the bismuth oxychloride. This is the routine meal in all cases.

The examination is best conducted with the patient standing, and the screen is employed as much as possible. Much more definite information is obtained by this means. Radiographs are mostly of use for demonstration purposes, although in some cases both methods are advisable.

After a halfpenny has been placed over the umbilicus by means of Z.O. plaster it is advisable to allow the patient to be covered with a thin garment, so as to cut off many of the soft rays and also to add to the comfort, as frequent examinations of the same case must sometimes be made many times. In sickly patients the horizontal position should be adopted, otherwise the erect method is always employed, as this is the usual posture during digestion.

A much debatable point is whether the patient should be specially prepared for a bismuth meal. Some authorities recommend purgatives and enemata beforehand, as in the preparation of an abdominal section. It seems, however, much more rational that an examination of this sort should be carried out under normal conditions, and with this in view the patient is simply told not to take any aperient, and to starve for several hours previously. It so often happens, especially in cases of stasis, than an aperient will subsequently lock the bowel for several days afterwards that on this account it is deemed inadvisable to recommend it.

Oesophagus.

This is generally best examined in the right anterior oblique position, though occasionally the left posterior oblique may be preferable. It sometimes happens that the course of the oesophagus is irregular, and so both positions may be employed.

As a rule the normal meal is given, which may be made thicker or thinner if desirable.

If the information afforded by this means is not satisfactory then a cachet should be employed. After giving the patient a cachet, several draughts of liquid should be swallowed, as it is not infrequent for some delay to occur behind the aortic arch, or even by the cardiac orifice.

Solid bougies, watch-chains, &c., have been employed, but they are now discarded as being dangerous.

In a case recently, when a patient swallowed a tooth-plate made of vulcanite, the screen examination did not reveal anything. When a bismuth meal was given, however, it was seen to be impeded at a certain point half-way down the oesophagus. By means of the oesophagoscope the plate was subsequently recovered.

Diverticula are clearly seen and have been definitely diagnosed, also obstruction due to cicatricial stenosis following the swallowing of caustics, and also malignant stenosis has been revealed.

The picture cast by cardio-spasm is clear and definite. As a rule, the food collects in the lower end of the oesophagus, which becomes spindle-shaped: 10 oz. can often be thus accommodated. The spasm may continue for a variable length of time, and then suddenly relaxes, and the food is seen to normally fall into the stomach.

Stomach.

The stomach as generally viewed is either boat-shaped or more usually J-shaped, lying to the left of the middle line, with its lowest level corresponding with the umbilicus, and with the pylorus to the right and about 1 in. above the umbilicus.

There is no organ in the body so subject to such variations in form as the stomach. Really there is no normal stomach, as each individual possesses a stomach that fits his body. It varies, as the face. Normally, the stomach empties in four to four and a half hours. The contractions are well marked, passing from cardiac to pyloric end.

Occasionally from fatigue the peristalsis ceases, or partly ceases, for a time, but gentle stroking of the abdomen over the stomach-region will generally renew the contractions.

The classification adopted is hypertonic, orthotonic, hypotonic, and atonic.

As visualized by the X-ray the stomach is divided into three parts, each part approximately one-third of that organ—viz., the pars cardiaca, pars media, and pars pylorica. Generally the first two divisions are vertical, and join the third at an angle. At the distal portion of the pars pylorica is the antrum pylori, leading in to the pyloric sphincter. A collection of gas, the " magenblase," is generally present at the upper end of the cardiac part. This magenblase is oval if the stomach be empty, but if there be a quantity of food in the stomach the shadow represents the arc of a circle, the lower border being a straight line.

In cases of hypersecretion, such as often occurs in pyloric ulceration, this condition is clearly revealed by giving the patient a little sodium bicarbonate and then watching the rapid increase of the " magenblase."

Ulcer of Stomach.

This condition is not always readily recognized. Occasionally, when the pars cardiaca or pars media have been involved, a well-marked notch or " incisura " has been evident, and a pseudo hour-glass stomach formed.

If the bismuth meal should lie beneath the level of the incisura, this latter may be visualized by palpating over the stomach area with the gloved hand or with a wooden spoon. By this means the food is driven back, and frequently the incisura becomes evident.

The spasmodic or pseudo hour-glass stomach may be differentiated from the true hour-glass variety by gentle stroking over the area. In the true form the constriction persists, otherwise it relaxes. Again, when the spasm relaxes, the meal is seen to fall suddenly into the lower part of the stomach, whereas in the organic form the food simply trickles through the junction. The greatest safeguard, however, is the re-examination of the patient on one or two other occasions.

The meal is usually retained in the stomach for a period beyond six hours. This is always a most useful sign, provided there be no tumour-formation. The reason of this is that the acid chyme, when it passes into the duodenum, causes the normal closure of the pylorus, and this only reopens when the acidity has been neutralized in the duodenum. Therefore, with hyperacidity each pyloric closure will be longer, whereas with achylia or hypoacidity each closure will be shorter, hence the stomach will empty quicker than normal. Often a painful pressure-point is located, which moves with the stomach shadow.

If a normal stomach-outline with normal peristalsis be present with the retention of food and hyperacidity, a gastric ulcer is generally present.

Pyloric ulceration is suspected if the stomach be normal, the peristalsis be rather active, the secretion be very active, and the stomach empty slowly.

Pyloric stenosis is generally due to a contraction resulting from a callous ulcer. This, of course, may at any time undergo malignant changes. Pyloric stenosis always causes a dilatation of the stomach and retention of the meal, which may remain in the stomach for hours or days. If retained after six to seven hours, pyloric stenosis should always be suspected.

Reversed peristalsis usually occurs.

Increased peristaltic waves also occur, and these are generally writhing in appearance, with frequent pauses.

Adhesions or fixations cause distortion of the gastric shadow, and prevent its normal movement.

Duodenal Ulcer.

This occurs more frequently than gastric ulcer. This is suggested if the stomach be hypertonic, and the peristalsis active with rapid emptying of the organ. Often in such cases the stomach has been seen to empty within an hour. If empty within three hours, this condition must be suspected. The cause of this rapid emptying is probably due to the so-called myenteric reflex.

The explanation of this reflex is as follows: Stimulation of the mucous membrane of the alimentary tract at any point causes a contraction of the musculature above, and a relaxation below, the point of stimulation. In this case free hydrochloric acid is the stimulus.

When during the process of digestion free hydrochloric acid is liberated, and remains uncombined with albumen, then the myenteric reflex acts so as to cause a muscular contraction above the stimulated antral mucous membrane, and relaxation below—that is, the pyloric sphincter will relax, and allow a jet of chyme to go into the duodenum.

As soon as the free acid strikes the mucous membrane of the duodenum another similar reflex is set in motion, which causes a contraction of the pyloric sphincter above and a dilatation of the rest of the duodenum below. This contraction of the pylorus will persist as long as there is free hydrochloric acid in the duodenum—that is, until the secretion of alkaline intestinal juices is enough to neutralize it. Then the presence of hydrochloric acid on the stomach side of the pylorus will cause it to open, and a similar series of events follows.

This normal reflex, of course, can only take place if the wall of the duodenum, where the myenteric plexus is situated, is intact. Any injury to the wall will interrupt the reflex arc. Then, when material containing free hydrochloric acid has been squirted into the duodenum, the absence of this reflex will cause the pylorus to remain open or relaxed, thus admitting of a very rapid emptying of the stomach. This occurs in lesions of the duodenum not extending to the pylorus, and not enough advanced to mechanically obstruct by cicatrization. This condition also obtains in achylia gastrica, as a result of chronic gastritis or secondary to carcinoma of the gastric fundus, depending here upon the absence of the hydrochloric-acid stimulus when the first chyme reaches the bulb of the duodenum. Therefore, we must remember that gastric hypermotility may exist in achylia gastrica, carcinoma of the gastric fundus, and duodenal ulcer.

The majority of ulcers occur in the first portion, or " bulbus duodeni." This is the point where the jet of acid chyme impinges on the duodenal wall, and is therefore the one place in the duodenal tract that is subject to continual and repeated traumata.

An excellent plan to adopt in taking plates of duodenal cases is to have the patient lying on the right side, so that the rays go laterally through the body. In this way, partly by the force of gravity and partly by peristaltic action, the antrum and first part of the duodenum are filled very completely.

Normally the first part of the duodenum, or " bulbus duodeni," or Bishop's cap, shows as a well-rounded smooth solid shadow. There are no valvulae conniventes in this part, whereas in the second and third parts there are, thereby causing a serrated or " accordion-pleated " appearance.

If after taking several plates on different occasions, a defect exist similar in each plate, a real pathological condition of the duodenum must be suspected.

It must be mentioned and noted that in several cases when the stomach has emptied within three hours and a half, operative procedure has occasionally disclosed a diseased appendix, and nothing else.

The Intestines.

Normally at the end of about four hours the bismuth meal reaches the caecum. When in the jejunum it appears flocculent, and when in the ileum more solid and formed. Sometimes the appendix appears distinctly. As a rule the middle of the transverse colon is reached within nine hours.

When the meal is in the large bowel it is readily recognized by the cog-wheel appearance.

The splenic flexure is reached about the twelfth hour, and the sigmoid generally at the end of twenty-four hours. Exceptionally, a meal has been known to pass, per rectum, at the end of twelve hours.

If a meal occupy more than forty-eight hours in reaching the sigmoid, then stasis is present.

Frequently the transverse colon is found to occupy a position low down in the pelvis. This always happens with a proptosed stomach, causing a lowering of the gastro-colic omentum.

Kinks or obstructions due to bands or new growths can be detected readily, provided the lumen of the bowel be so small as to retard the progress of the meal. A pseudo-kink will disappear on palpation, whereas a genuine kink will persist. In early cases, when the lumen is only slightly interfered with, a condition of this sort may be overlooked. In normal individuals the hepatic and splenic flexures almost invariably appear to be acutely kinked. This is the result of the shadow being cast in a single plane, and appearing acute, although they form a wide angle when looked at from the side.

Sometimes the "double meal" is given—*i.e.*, the usual meal given, and several hours afterwards, when it is on its way along the intestines. a second meal administered—to investigate the condition of the stomach,

The single meal, however, is preferable, as the result of the double meal may cause confusion of the shadows.

In hospital the plan adopted is as follows: For examination of the stomach—The meal is given three hours before my arrival; the Resident examines it several times previously and subsequently. For intestinal examination—Plates are made at the end of eight hours, twenty-four hours, thirty-six hours, and so on if necessary.

In private: The bismuth meal is given at 9 a.m., the patient is watched on and off till the stomach is empty, and if the intestinal examination has to be made, frequent fluoroscopic views are made, and plates taken according to appearances, necessities, &c.

Perhaps the best writings on the subject of the bismuth meal have emanated from Walter Mills and R. D. Carman, published in "Surgery, Gynaecology, and Obstetrics," and by A. E. Barclay in his excellent book. From these authorities some of my remarks are borrowed

X-Ray Therapeutics.

So essential a part now do the X-rays play in the treatment of diseases of the skin that it is generally recognized that the armamentarium of the dermatologist is incomplete without such an installation. Perhaps the greatest triumph has been in the case of ringworm of the scalp. These cases should be treated by this method as soon as the condition is diagnosed. With due care the risks are infinitesimal. Although considerably over one hundred cases have been irradiated, in only one instance, so far as one knows, was there produced a permanent patch of alopecia, and this only the size of a two-shilling piece.

The method of Kienbock is to be recommended in quiet cases, whilst in those where the children are restless the large cylinders are preferable, as the area can then be more definitely controlled. Until epilation is complete, the iodine and spirit spray of Sabouraud (tr. iodi. 1 part and spts. vini. rect. 9 parts) is used.

In the treatment of skin-diseases two methods are advocated by their respective adherents—the frequent small-dose haphazard method and the intermittent measured dose. This latter always appeals to one as being the more scientific procedure. The measurement employed is always that of Sabouraud. The pastilles can be used over and over again by placing them in Petri dishes and exposing them to the sun for a short time. In cases of filtration an aluminium filter $\frac{1}{3}$ mm. thick is generally employed.

Experience teaches that it is safer to adhere to the simpler methods, with as little variation in detail as permissible. If an accentuated reaction be required in one or several discrete parts an application of pure carbolic acid is sometimes employed, or occasionally carbon-dioxide snow. Care must always be taken to look out for reaction, and if in doubt wait a while.

By means of Sabouraud's pastilles doses may be measured in halves, thirds, or quarters by carefully comparing with tint B. If more than a full dose be required, this too may be carried out by comparison. Sometimes after several full doses have been given a few half or third doses may be required, or then again in certain cases a dose and a half-dose may be given right away. Cases of acne vulgaris are very responsive to X-ray treatment, and especially the keloid variety. Just over one full dose combined with the usual treatment in such cases generally suffices. Individual keloid masses may require further dosage. Undertreat rather than overtreat these cases, so as to avoid wrinkling. If such should occur the cure is worse than the disease. In several cases of alopecia a full Sabouraud dose followed by the usual treatment has proved very successful.

Two well-marked cases of arsenical eruptions on the hands responded well to irradiation. Cases of dysidrosis also respond well, and full doses have given excellent results.

Chronic eczemas do very well—the more chronic the condition the better the result.

Many cases of exophthalmic goitre have yielded excellent results with X-ray treatment. Usually one full dose filtered is given once a week, directed at different angles till an erythema appears, and then at longer periods. It must be remembered that these cases should be prepared to undergo irradiation for months; a short course of treatment is of little avail. If such cases are operated upon subsequently it is always found that the gland is firmly fixed to the trachea, due to the fibrosis, which has been produced by the rays. Hodgkins disease has, on the whole, responded satisfactorily to this form of treatment. The very acute cases are, of course, hopeless, while the subacute and chronic forms yield satisfactory results. It is sometimes quite remarkable how rapidly the glandular enlargements disappear. At the same time, the general condition of the patient does not always improve *pari passu* with such decrease. Recurrences, too, must be expected and treated accordingly. In these cases cross-firing should be adopted, especially in connection with the thorax, as the mediastinal glands are so frequently involved. Heroic treatment must be adopted in these cases, as there is no time to be lost in their handling. Full filtered doses are given once a week over every area, and from different directions.

Hypertrichosis must be handled very carefully. Some results have been excellent, and some have resulted in slight wrinkling. The patients are always warned of this. The best results have been obtained by a full unfiltered dose, followed about six or eight weeks subsequently by a full filtered dose.

Keloid.—Since I had the honour of reporting the first case successfully treated, now many years ago, many hundreds have yielded very excellent results. Treatment must be repeated several times, and occasionally painting with carbolic acid greatly assists. Care must be taken to avoid telangiectasis. Unfiltered doses are given, usually one-third dose to start with, followed by one full filtered dose at an interval of three weeks. This usually suffices.

Keratoses are rapidly and easily removed. If few and discrete, carbonic snow suffices ; if multiple and suspicious-looking, then X-rays are used.

Leucaemia responds better to irradiation than to any other form of treatment. Treatment must be repeated at intervals, and all the bones should be well saturated with rays, and lastly the spleen. Full filtered doses are freely given over each area once a week, carefully observing for a reaction.

Lupus.—The sebaceous forms of lupus erythematosus yield excellent results in doses at first unfiltered and then filtered. Several cases of hyperidrosis have been cured. Full unfiltered doses are given once a week till a reaction appears. Similar good results have often been obtained by the same treatment in cases of pruritus ani et vulvae.

Rodent Ulcer.—This very common disease usually yields very excellent results with X-rays. Many cases out of hundreds that have been treated are seen occasionally that have remained well for periods varying from two to twelve years.

Again, other cases are apt to recur no matter what care be taken in their treatment. Sometimes a preliminary curetting is performed or a cauterization with carbolic acid, and then full unfiltered followed by filtered doses at intervals till a good reaction is seen.

When bone and cartilage are involved the results are unsatisfactory. The epithelium grows over, only to break down subsequently and expose a much involved base. Most of the text-books were very slow to recognize this condition and call attention to it.

Tubercular glands are very amenable to the X-rays. Full doses filtered are given at intervals, and cross-fire methods adopted. Care must be taken to look out for suppuration, as the pus cases must be evacuated. With care and perseverance the results are really excellent.

Malignant Disease.—It must be generally admitted that Röntgen-therapy has done a great deal in the alleviation of malignant disease; and even if cures have not been effected, the general condition of the patient has been improved, retardation of the growth produced, together with the drying-up of discharge and the healing of ulcerated areas, and amelioration of pain. It is most essential that special care should be devoted to the treatment of malignant disease in conjunction with surgery—I say surgery advisedly, for let us never forget that when a malignant case presents itself for treatment the question of surgical interference should always be first considered.

Notwithstanding the improved technique of Halstead, Rodman, and Handley in cases of mammary carcinoma, it was recently stated by Murphy, in a lecture delivered before the American Surgical Association in Cleveland, that the statistics had not much improved.

It has been stated that 52 per cent. of patients with epithelioma of the lip, without any demonstrable metastasis at the time of the operation, die a cancer death, while with those who have enlarged glands the percentage is increased to 76.

Referring to the end results in the purely surgical treatment of malignancy, Dr. Murphy said, " An analysis of that class of cases disheartened me very much, and an analysis of the more extensive operations done in various portions of the body later has added to my discomfort, and has made the cancer field rather a hopeless proposition to me. I think we can honestly say that we have not improved our cancer results in the last quarter of a century." Murphy, of course, refers to those regions in which the cancer is always peculiarly virulent on account of their rich lymphatic supply. It must always be remembered that the virulence of malignancy increases or decreases very strictly with the richness or the poverty of the lymphatic supply in the various parts of the body. It is recognized that the Röntgen rays decrease lymphatic permeability, and thus tend to prevent dissemination of the cancerous process. Thus, if recurrences and metastases are not prevented they are often postponed, and some inoperable cases are rendered operable. Recurrences, after removal, are regularly more malignant in type, more rapid in progress, and more prone to metastasis than was the original lesion.

Partial operations are seldom indicated. They do not tend to prolong life nor relieve suffering. The X-ray dosage in such cases must be given powerfully enough to produce the desired effect. Small, inefficient doses will tend to increase the growth and promote metastasis. To obtain the best results irradiation should be employed as soon after the operation as possible.

In the medullary forms of scirrhus the stroma is increased and the cell elements diminished, and thus the less malignant scirrhoid type is produced. Also, in cases where the mediastinal and bronchial glands are involved, great relief is obtained.

Many hopeless cases present themselves when almost in a septic condition, and often after a few treatments there is a marked improvement in the disease itself, and in the comfort of the patient. The question of anti-operative treatment is often discussed, but, on the whole, the post-operative treatment in operable cases appears to be the wiser course.

It must be remembered that in a very large number of cases of recurrences the personal equation of the surgeon must be taken into account, and, by offering assistance by the means of X-rays, it is to be hoped that surgical procedure will be just as thoroughly and conscientiously performed, thereby leaving as little as possible for Röntgen-therapy. It is well known that growths in the upper part of the face are less malignant than growths lower down, and thus glandular involvement is less. Care must always be taken to look out for glandular swellings before, during, and after treatment. In several cases glands have enlarged some months after the original growth has been successfully treated.

Each case treated must be taken on its merits, and although surgery offers the best means for the treatment of malignant disease, in many cases and under certain conditions the X-rays may be conscientiously employed.

My views are in accord with those of Russell Boggs, of Pittsburg, who has recently written an able paper on this subject in the *American Journal of Röntgenology*, and concludes by craving for a more conservative treatment of malignant growths, in order to secure better results in curable cases and to afford more palliation in hopeless cases, for, as he points out, the degree and location of malignancy should determine the treatment. Good results follow from early operations when favourably situated. Post-operative irradiation even in these early operations decreases recurrences. Some unfavourable cases can be made more favourable for operation by anti-operative treatment, and hopeless cases which have not been operated upon derive more benefit in comparison with hopeless recurrent cases.

It may be truly stated that in cases of malignancy the Röntgen rays are of considerable value, both as an adjuvant as well as a palliative.

Radium.

Thanks to Wickham and Degrais, radium now occupies an important position in the armamentarium of therapeutic agencies. The report of Hayward Pinch of the work at the Radium Institute, which has recently appeared in the B.M.J., is exhaustive, concise, and modest.

Let me repeat a prefatory statement of his : "The repute of radium has suffered severely from that irrational enthusiasm and that unthinking expectation which often attend the debut of a new remedy. These distorting influences have been especially marked in the present instance, for radium has astounding physical qualities, and it seems to have been assumed that its therapeutic powers must be equally penetrative and marvellous."

Some really marvellous results are obtained with radium, as with the X-rays, and there is no need to extol one agent at the expense of the other. Certain malignant conditions have been relieved and apparently cured by radium, as with the X-rays, but this is no reason for stating that a cancer-cure has been discovered.

Conscientious working with radium does and will yield excellent results in many conditions, providing dosage and filtration be carefully studied. Underdosage may be often harmful, and irritate a condition.

In many cases it resolves itself into a race between the radium-dose and the rapidity of the growth. This must be carefully watched, and if the growth appears to be gaining, increase the dose.

My supply of radium consists of 110 mg., chiefly on varnish applicators, and of quarter-strength. The applicators being shaped in squares and circles, practically any shape may be produced by placing them, after being enveloped in rubber dam, on Z.O. plaster. As a filter for many months I have been employing Z.O. plaster, in thicknesses of from one to twenty layers. This answers splendidly. The next most frequent filter employed is the lead filter $\frac{1}{10}$ mm. thick. In many cases with much crust formation it is frequently unnecessary to use any filter, as the crust will answer this purpose. It is advisable to work with as few variations as possible, as by this means good results are more easily achieved.

As to dosage, I generally prefer one large dose to several smaller ones. By this method comparisons are simpler, the patient is saved trouble, as the radium may be applied during the night-time, and with a small supply the operator's work is greatly facilitated.

Rodent ulcers have yielded the best results of all cases. Always treat a larger area than that involved. The same point should be remembered here as with the X-rays—viz., when bone and cartilage are involved, new epithelium will often grow over, and later on break down and expose a very much involved area beneath. In such cases of cartilage and bone involvement the advantage of an operation should be explained to the patient fully.

Many cases of superficial epitheliomata of the face, trunk, and extremities have yielded very good results. In several cases, too, following an operation, where cancer had recurred in the scar, excellent results have been obtained.

Always be prepared for secondary glandular enlargements. This may happen even when the primary focus has healed, and is the strongest point for operation *versus* radium. Of course, too, in operations, even after a most thorough removal of the glandular areas, a recurrence may appear. Every phase should be explained to the patient, and only after mature consideration on the part of both patient and operator should a decision either way be arrived at.

In a few cases of early carcinoma of the breast, when for various reasons operation was refused, there have been excellent results with large doses. These cases especially should be kept under supervision on and off for years after treatment. Always impress the patient that the condition is "apparently cured," rather than "cured." It is better to err on this side.

Naevi.—The flat superficial varieties, the simple angiomata or port-wine marks as they are better known, require careful handling. The disadvantage of using squares and circles in such cases for long exposures is that the corresponding marks are often left behind. Therefore, in these cases, small frequent doses are preferable, so as to enable the constant alteration of the position of the radium. One must proceed carefully in these cases, and repeat the process a second or a third time if necessary, taking care to avoid, if possible, subsequent telangiectases.

The cavernous angiomata, or strawberry marks, respond very well, as a rule, to radium, and frequently the cross-fire method can be employed. Quite a number of these involving the lower lip have yielded very excellent results. One case in particular, where the child's lower lip was three times the normal size, was completely cured within nine months.

The naevus araneus, or spider naevus, gives such excellent results with electrolysis that I prefer this method to others. Several cases of naevus pigmentosus, or ordinary pigmented mole, have been cured, leaving more delicate and softer-looking scars than would have been produced by an operation.

Keloids are very amenable, but though it is easier to treat these cases with radium I doubt if the results are superior to those obtained with the X-rays. With due care every case of keloid can be cured by either one of these methods. With radium both filtered and unfiltered doses are used, according to the size of the scar.

Lupus Vulgaris.—One case in particular must be mentioned. The side of the cheek was involved and had almost perforated. For several years X-rays had kept it in check, and then it grew rapidly. Large filtered and unfiltered doses of radium rapidly healed it up; and the condition is apparently cured.

Several cases of lupus erythematosus have done very well. Frequently in these cases it has been found advisable to employ CO_2, as this will occasionally have the desired effect.

Now, ladies and gentlemen, I shall conclude this paper, and I trust that it has not wearied you. Members have favoured this section with a number of most interesting papers, and I trust that they will be attentively listened to and freely discussed, and that at the end of the session all the members will feel that good work has been accomplished and cordial good feelings have been mutually established.

NOTES ON THE TREATMENT OF DEEP-SEATED ORGANS BY FILTERED X-RAYS.

By Stanley S. Argyle, M.B., M.R.C.S.,
Medical Officer in Charge of X-ray Department, Alfred Hospital, Melbourne.

The discovery that it was possible to separate X-rays of varying hardness or penetrative power by the interposition of a screen of aluminium or other material between the source of the rays and the skin of the patient may be justly regarded as one of the important milestones in the history of Röntgen-therapy. Previous to that discovery any attempt to treat a lesion by the X-rays with doses greater than those capable of endurance by the skin was accompanied by consequences so serious that only in cases of extreme gravity, when all other treatment was quite hopeless, was it ever undertaken at all.

Bergonié, Recarmier, and other observers who experimented on small animals discovered that the ovaries were atrophied by the X-rays, but in 1906 Laquerriere stated that "in large animals and in the human subject the distance of the ovary from the abdominal wall made it hopeless to expect any noticeable or permanent action on the gland without the risk of radio-dermatitis." But the filtration method removed this risk, and it was in gynaecology that the new method was first tried, and uterine fibro-myoma was the most tempting field for experiment.

The fact that these growths often disappeared with the menopause, and that the removal of the ovaries by surgical means frequently caused them to retrogress, caused radiologists to infer that a similar result might be obtained by irradiation of the ovaries. The first work was done in France, where Fouveau de Courmelles obtained astonishing results in over fifty cases. Later, Fraenkel, of Charlottenberg, reported twenty-eight successful cases. Amongst the many Continental observers at this period, I believe Bordier, of Lyons, to have been the first to use carefully measured doses of deep irradiation through an aluminium filter for the treatment of uterine fibro-myoma. Bordier published his first results in the "Archives d'Electricite Medicale" in 1909. His technique at that time was to give six exposures between each menstrual period, using a tube of penetration 9–10 Benoist, through aluminium filters varying from 0·5 mm. to 1·5 mm. in thickness. The dosage was regulated by one of his own pastilles, which was placed on the skin and exposed under the filter until it acquired tint O. The exposures were made through three different points of entry in each case. During the following year, Albers-Schönberg, at the Berlin Congress of Röntgenology, reported ten cases of successful treatment, but the dosage was inexact and the treatment very prolonged. I have been unable to ascertain if filters were used in his cases at this stage. In 1911 Bordier read a paper before the Academy of Medicine, in which he further elaborated his technique to secure more accurate dosage. He then advised that each series of treatments should consist of nine irradiations given through three separate ports of entry, and through aluminium filters from 0·5 mm. to 3·8 mm. in thickness: total dosage, 5I. He reported eighteen cases in this paper in which he claimed to have obtained successful results.

In 1912 Bordier read a paper before the Electro-therapeutical Section of the Royal Society of Medicine, in which he found it necessary to modify somewhat his technique. Time had shown that his skin-protection had not been sufficient to prevent tardy skin-injury, which only developed itself long after treatment had ceased. The dose tint O, obtained with the pastille placed on the skin of the patient and under the filter, was too strong to be often repeated.

His modified technique was to place the pastille on top of the filter, and always to give the same dose, tint iii, on his scale, and to vary the thickness of the aluminium filter with the port of entry and the number of the treatment series. The comparing of the tint with the standard scale was always carried out in artificial light, preferably that of a match or candle. The quantity of X-rays incident on the filter was calculated as being 5H or 3·6I, the filtered dose received by the skin being: Through 0·5 mm. aluminium, 2I, or 2·8H; through 1 mm. aluminium, 1·3I, the total dose on the first series received by the skin at any one port of entry being 7H. This was reduced at each subsequent series by increasing the thickness of the aluminium filter until in the fifth and last series the skin would only receive 2H, or less than half of a Sabouraud pastille dose.

In conjunction with Guilleminot, Bordier by an elaborate series of calculations estimated that during four series of treatments the total dose absorbed by the skin is 20H. Of this, 12H would reach the surface of the fibroma in a person of average stoutness; 7·2H would penetrate 1 cm.; 4·8H, 2 cm.; 3·6H, 3 cm.; and 2·6H, to a depth of 4 cm.

A similar calculation estimated that the ovary would receive 25 per cent. of the incident rays on its anterior surface and 20 per cent. on the posterior surface. How far these calculations can be depended upon it is difficult to say, so many factors have to be taken into consideration which may materially modify them ; but on the whole they appear to me to be the first really rational attempt to grapple with the extremely difficult question of deep X-ray dosage, and far ahead of the rule-of-thumb methods previously in vogue.

At the present time most of this work is being carried out in Germany, where two distinct schools of technique exist—that of Albers-Schönberg, at Hamburg, and C. J. Gauss, of Freiburg. The former advocates the use of tubes of moderate hardness, an aluminium filter of 2 mm. thickness, a single point of entry, and a total dosage of from 60X to 100X, which is equivalent to 30H to 50H. No regard is paid to the duration of treatment. The Freiburg School, on the other hand, applies massive doses of X-rays in as quick a time as possible.

Professor Gauss, in a paper read before the British Medical Association last year, explained his technique. He stated that he used aluminium filters 3 mm. in thickness, from thirty to fifty points of entry, attacking the growth by cross-fire methods from all sides. The total dosage being from 600X to 1,000X, each separate skin port receives 20X, or practically 2 Sabouraud pastille doses. This dose is repeated at each irradiation period at intervals of two and a half to three weeks, until a cure is obtained and all possibility of a recurrence is prevented. Gauss claims to have cured all cases of fibroma that he has treated, and that the average time of treatment was eight weeks, the total dose in each case being 1,800X.

All observers are agreed that women under the age of forty are much more difficult to treat than those over that age, and some authorities consider that cases under forty should be reserved for surgical treatment. After careful consideration of the technique and records of various authorities, I decided to follow, as closely as my apparatus would allow, the procedure advised by Bordier. My greatest difficulty was to obtain tubes of the required hardness. They appear to be unobtainable in Australia. Fortunately, I had in my possession some old tubes which I had discarded on account of their having been too hard for any ordinary use, and which had been reposing in their boxes untouched for several years. When put aside it had been almost impossible to force any ordinary current through them, and the risk of penetration was very great, owing to the external sparking that took place. The prolonged rest had improved this a little, and the question became one of whether they would stand the strain long enough to obtain the necessary dosage to colour Bordier's pastilles to the required tint. By careful nursing and frequent tube-changing I was able to set aside four or five tubes which seemed capable of carrying out the work until I could obtain fresh supplies. My results have been distinctly encouraging. In some cases the improvement took place from the first series of irradiation, and shrinkage of the fibroid, followed by absolute stoppage of the haemorrhage, occurred before the complete dosage was received. One case, aged forty, after complete disappearance of the fibroid and absolute cessation of menstruation for four months, relapsed badly, and menstruation was re-established, with all the old constitutional troubles associated therewith. I am quite satisfied that my dosage in this case had been insufficient, chiefly due to defects in the working of the tubes, coupled with extremely active ovarian function in a patient only forty years of age. Beyond a slight bronzing, I have up to the present experienced no skin-troubles whatsoever. It has been my practice to place a piece of chamois-leather beneath the aluminium filter to protect the skin from secondary rays. Static electrical effects were guarded against by careful grounding of the filters. In some cases constitutional symptoms, such as those associated with the menopause, occurred after the second series of irradiation had been received, and in one case attacks of nausea and faintness occurred immediately after an irradiation and before the patient had left the operating-room.

In addition to uterine myomata I have used deep irradiation through aluminium filters in enlarged spleen in leucaemia, enlarged prostate, enlarged abdominal glands, enlarged thoracic glands, tumour of the hypophysis, and glioma of the brain. The last two cases being under treatment at the present time, it is impossible to form any idea of the probable results of the irradiation. In both of these cases decompression operations had been done, so the protection of the bony skull had in part been removed. The results generally of deep irradiation are very promising, and with the steady improvement in technique and apparatus one may confidently hope for good results in the near future.

CASE OF ROUND-CELLED SARCOMA.

By W. McMurray, M.D.,

Hon. Dermatologist, Sydney Hospital.

Mrs. P., aged thirty-two years, married, consulted me on the 1st September on account of a swelling in her face. Her history is as follows: Father, mother, four sisters, four brothers, all alive and in good health. She has never been pregnant, nor suffered from any constitutional disease. Her trouble began early in February, when she found difficulty in breathing through her nose. She consulted Dr. M., but as he did not seem to understand her case she went to Dr. B. He examined her nose, and told her he did not think it was serious, and gave her a mixture to take, and told her she would be able to breathe through her nose before she had finished the bottle of medicine. She was no better, however, a week later, and consulted him again. He prescribed another mixture stronger than the first, and as this did not benefit her she left him and went to Dr. M. (No. 2) on the 1st March. He examined her nose, and had a Wassermann done, and two days later sent her to Dr. H. to have a radiograph. This showed a growth in the left superior maxilla encroaching on the left nasal fossa. He sent her into the hospital, when an injection of salvarsan was administered intravenously by Dr. F. on the 11th March. No benefit was derived from this, so in a few days she went back to Dr. M. He said the growth was rapidly spreading, and advised her to go into the hospital again, and suggested removing a portion of the growth for a biopsy. Next day he had a consultation with Dr. N., and they decided not to do this, but at a later date to remove the entire growth from the nose. This was done on the 27th March. She left the hospital on the 8th

April, and continued to visit Dr. M. up to the 16th April. As he was going abroad, he told her if anything went wrong to go to Dr. N., as he was familiar with the case, being present at the operation.

Everything went well until the beginning of May, when the obstruction in the nose returned. She let this go on until her face began to get swollen on the left side. Becoming alarmed, she went to see Dr. N. on the 27th May. He said that she must place herself under a general surgeon, and have the bone removed. She then consulted Dr. X., whom he recommended, and he concurred with Dr. N., and advised the operation at once. She went into the hospital on the 1st June, and was operated on on the 4th June, when the left superior maxilla was partially removed. Recovery was prompt, and the wound healed. She left the hospital on the 13th June.

For a month everything went well, when the right nostril got blocked. She went to the surgeon and told him, and he advised her to call and see him every week. On the 25th July she had considerable pain, for relief of which she went to the hospital for injections. Had three in all—29th July, 7th and 14th August. During this time the growth returned with renewed vigour. Every day it seemed to progress, spreading all over her face, upper lip, and roof of her mouth. It was impossible to close her mouth, on account of the swelling. The doctor told her then he could do no more for her, and advised her to go into the hospital. There she remained for four days, but as they were not doing anything further for her she left on the 31st August.

I saw her on the 1st September. Her face was swollen (especially the middle portion); there was a marked, hard indiarubber-like infiltration of the subcutaneous tissue. Skin was of a light-violet colour, desquamating. The contour of her features was entirely altered, and had an elephantastic appearance, on account of the enormous hypertrophy of the upper lip; so much was this enlarged that she was unable to touch the vermilion border with the tip of her tongue.

Inside the mouth the hard palate on the left side felt thickened, and appeared more depressed than the right. The mucous membrane was unaltered. All the teeth in the upper jaw were absent except two incisors and left third upper molar. A sequestrum of bone was visible in the antrum. This separated, and was removed subsequently.

Before commencing treatment I asked her to get a report from the pathologist regarding her condition. He writes as follows: "Dr. M. asked me to test Mrs. P.'s blood. He said the condition was either syphilitic or malignant. The Wassermann was negative, but to make sure a 606 injection was given, with no result. M. then removed the growth. It was a round-celled sarcoma. Went to Dr. X., who operated, and now matters are as you see."

On the 5th September a filtered pastille dose of X-rays was given over the growth. The following day when she awoke she felt her face soft, the swelling greatly diminished, and she could breathe through her nose. This continued, and when she returned four days later, on the 9th, the improvement was very marked indeed. It was then the photo was taken. I had considered the case hopeless, otherwise I would have had it taken before applying any treatment. A photo showed the swelling and desquamation of the skin.

Injections of $\frac{1}{7}$ gr. sodium arsenate were given daily for two months. As she did not seem to derive any benefit from the drug it was discontinued. Filtered X-ray doses to the hard palate and face twice weekly were continued, so as to guard against any relapse. The patient felt comfortable, breathing normally through her nose, eating and sleeping well, having gained 7 lb. in weight in a month.

On the 24th October a hard circumscribed swelling developed on the right leg, which disappeared twenty-four hours after a pastille dose with $\frac{2}{10}$ aluminium screen.

On the 28th October the nostrils became blocked. I found it impossible to apply the rays inside, having no speculum small enough I sent her into Sydney Hospital, where Dr. Langloh Johnston inserted a tube containing 50 mg. of pure radium for sixteen hours into the left nostril, and again on the 12th November he applied the same tube inside the right nostril for twenty-four hours. Since then the breathing has been quite free, two months having elapsed.

During November the hard palate remained thickened. She complained of a toothache pain, so I had the last molar extracted, and found underneath that the bone had necrosed. To the palate I continued to apply filtered rays through a bevelled speculum. This reduced the inflammation and relieved the pain. At the time of writing—20th January—the bone had not separated.

One can hardly be hopeful of a cure; still I think it is worth repeating as it demonstrates what can be done in hopeless cases of this kind.

TINEA ALBIGENA.

By W. McMurray, M.D., Physician, Skin Department, Sydney Hospital; and Norman Paul, M.B., Ch.M.

Having observed the marked prevalence of this disease in Australia, and its absence from dermatological literature, we feel that to many a description of this dermatomycosis, based on our own experience, would be of interest.

Definition.

A dermatomycosis due to a fungus of the genus *Trichophyton*, and characterized clinically by a vesicular or bullous eruption, associated with desquamation of the epidermis, or the desquamation may be present without the vesiculation, and generally localized to the hands and feet.

History.

In 1875 Tilbury Fox described a disease which he called "dysidrosis"—a vesicular and bullous eruption limited to the hands and feet." At the same time, and independently from the same case, Hutchinson described it under the name of "cheiro-pompholyx."

Nieuwenhuis, a Javanese physician, in 1907 described a similar disease under the name of "tinea albigena," due to a fungus which he called *Trichophyton albiscicans*. From our observations we believe these diseases to be very closely allied to one another in this country, and if the fungus is sought for it will be found in 80 per cent. of the cases.

Climatology.

It is more common in warm climates, and is reported as existing in Java, Ceylon, Indo-China, Siam, Malay Archipelago, &c. It is very widely disseminated in Australasia, and also occurs in more temperate climates. One of our patients who recently arrived from England stated that he had had repeated attacks there. From the scales we readily found the fungus. The disease sometimes remains quiescent in winter, or in those travelling to more temperate climates, recrudescing on their return.

Predisposing Causes.

Both sexes are equally affected. The earliest age of its appearance was two years and a half, in a little girl. It is most common in adults, and is rare after fifty-five. It occurs in all classes of society—*i.e.*, barristers, clerks, doctors, medical students, farm labourers, graziers, milkers, &c. In some of our patients we attributed the contagion to bathing-sheds. People in robust health are attacked as often as those debilitated ; one of our patients had the worst attack she had ex-experienced when on a holiday trip. It is more common in private than hospital patients. The disease is contagious, sometimes affecting all the members of a family.

Microscopical and Cultural Characteristics.

For the examination of the fungus in the scales, it is necessary to previously soak in liquor potassae for fifteen to thirty minutes. Examination now reveals the mycelium coursing through the epidermis. In parts only a few mycelial threads are visible, while in other parts a thick interlacing mass of the mycelium is observed. Sometimes the fungus is noticed occupying the inter-epithelial lymphatic spaces, and assuming the contour of the epithelial cells, giving it the appearance of an artefact. The mycelial threads show dichotomous branching. Under a higher magnification (1,000) the so-called " mycelial spores " are readily made out, and appear to have a double contour. They vary somewhat in size and shape, the majority appearing more rectangular than rounded, while others are more elongated.

Cultural Characteristics. (Interim Report.)

Reproduction.—The aerial fructifications show in hanging-drop preparations—(1) Conidia, supported by short sterigmata ; (2) septate spindle bodies.

Ordinary Glucose Agar, 2 per cent.—In about six days the growth becomes visible to the naked eye as fine radiating spicules, a few days later showing white duvet, and becoming somewhat acuminate in the centre, and of a cream-colour. With the increase in growth of the culture the duvet becomes scantier, and the surface more powdery, and the colour showing a delicate roseate shade. When killed with formalin after fourteen days and sealed the pinkish shade disappeared, and the original cream-colour remained, the centre appearing knoblike, tending to become crateriform.

(We regret that our cultures on French-proof agar and other sugar media are not sufficiently advanced in growth for description purposes in connection with this paper.)

Symptomatology.

It occurs in two types—A, a mild form, not causing the patient much inconvenience ; B, a more severe form ; but the one may merge into the other.

Type B.—The disease is characterized by desquamation of the epidermis and vesiculation, usually localized to the hands and feet. The lesions originate at various points as pinhead elevations of the epidermis, and spread, always showing an advancing scaling margin—at least where the epidermis is thin, as on the dorsum of the hands, toes, &c. This desquamation takes place at irregular periods, generally traversing slowly the greater portion of the hands or feet. On reaching the interdigital clefts of the toes, a situation where the epidermis becomes sodden on account of the excessive moisture of this region, mainly in the hot summer weather, and where extraneous organisms flourish, a severe pruritus is set up, causing the patient to scratch in order to relieve the itching, with the result that excoriation of the epidermis often takes place, and painful rhagades develop. This condition of the interdigital clefts is sometimes described as dermatitis rimosa of the toes. Associated with this desquamation is a vesicular condition occurring principally on the palms and soles, especially in those who suffer from hyperidrosis, but we have seen it on the dorsal surfaces. Frequently the attacks are of a mild character, a few vesicles appearing between the fingers, which dry up and desquamate in a week or ten days. In the more severe cases the vesicles run into one another and form bullae, which become secondarily infected, and after bursting leave the corium exposed and painful, accompanied sometimes with lymphangitis and constitutional disturbances, necessitating the patient to lie up. The vesicles, especially those on the soles of the feet, cause pruritus, owing to their situation beneath the thickened epidermis, and produce pain on walking. In one of our cases the affection spread slowly upwards to the knee, leaving a denuded violet, dry, non-infiltrated surface. This patient suffered from it for twenty-five years. A thickened condition of the skin sometimes follows the disease, but have not noted pigmentary changes to occur, as stated by Castellani. The disease is very chronic, many people suffering from the complaint for years.

Onychomycosis is sometimes present, the nail losing its lustre, becoming brittle, &c., as in other forms of ringworm of the nail, but differing in that the proximal portion is first, and more affected than the distal, on account of the fungus spreading along the digits, in contradistinction to the ordinary mode of infection of the nail through scratching the ringworm affection on some other part of the body. A condition resembling in appearance onychia has been observed, probably due to secondary infection of the vesicles.

Type A.—Some patients experience only desquamation, without the vesiculation, and many thus affected are unaware of the presence of the complaint, considering the scaling as nothing abnormal.

Diagnosis.

Amongst the more frequent eruptions with which this disease may be confounded are—(1) Eczema chronicum squamosum ; (2) syphilis papulo-squamosa ; (3) dysidrosis, and allied eruptions ; (4) a chronic tinea of the palm, plaque-like, with a thick, elevated, desquamating margin. But the one and only certain method of diagnosis remains with the microscope, and an examination of the scales removed from the desquamating margin should be made in every suspicious case.

Treatment.

1. *Prophylactic.*—Disinfection of the footwear with formalin, and the avoidance of wearing slippers, &c., of people who have the disease.

2. *Palliative.*—(*a*) Opening of the bullae, in order to relieve pain on walking; (*b*) the application of sedative and anti-pruritic lotions and ointments.

3. The disease itself is somewhat resistant to treatment, especially when the nails are affected. Amongst the drugs which act beneficially may be enumerated chrysarobin, tr. iodi. and lin. iodi., resorcin and ac. benzoic, &c.

X-rays given in one-third of a pastille dose weekly, followed by one-third pastille in a fortnight.

REFERENCES.

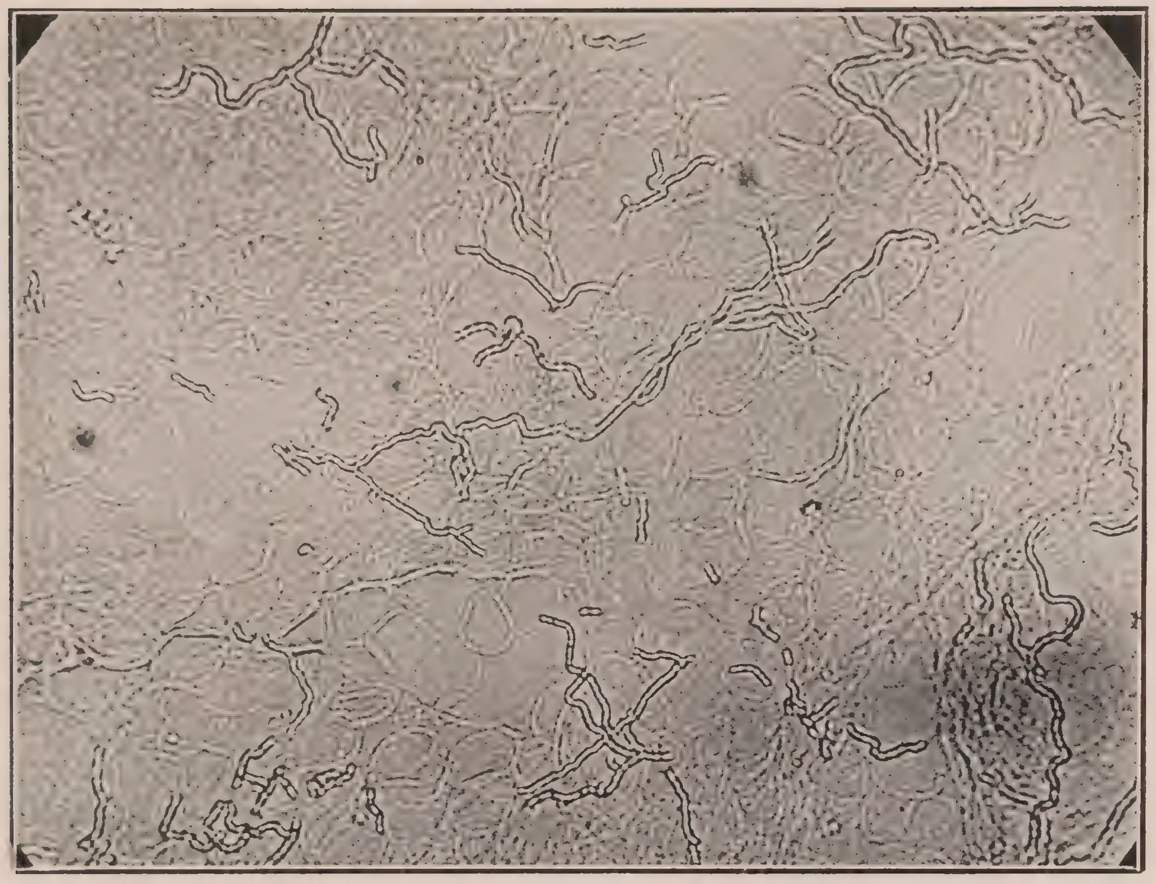
Castellani. "Tropical Diseases."
Fox Tilbury. B.J.D.
Whitfield, A. B.J.D.
Besnier. Brocq. and Jacquet Dermatology.
Sabouraud, &c.

LANTERN-SLIDES.

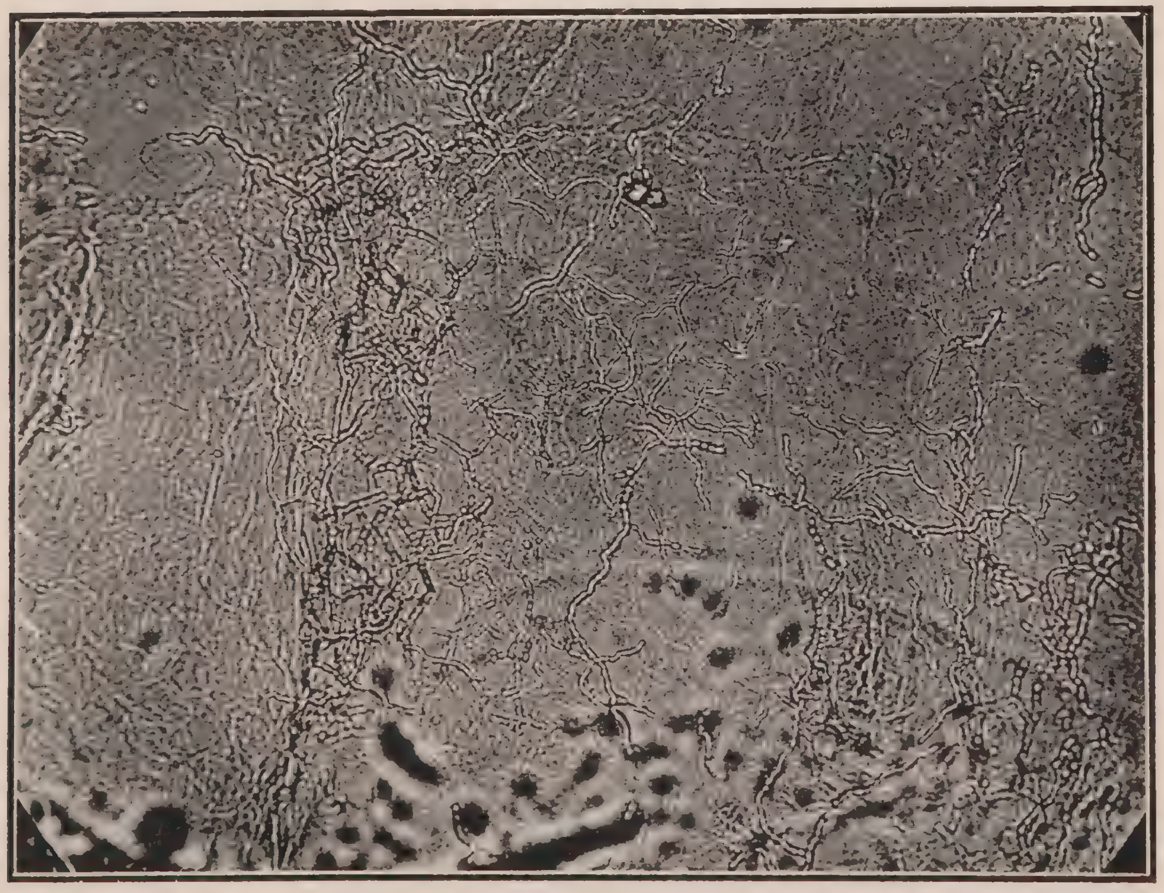
(Shown by Drs. McMurray and Norman Paul, Sydney.)

The *Trichophyton* in its parasitic life vegetates according to two types—A, mycelial filaments; B, mycelial spores.

The micro-photographs following are obtained from fresh liq. potassae preparations, the dark spots appearing in some of the slides being liq. potassae crystals.

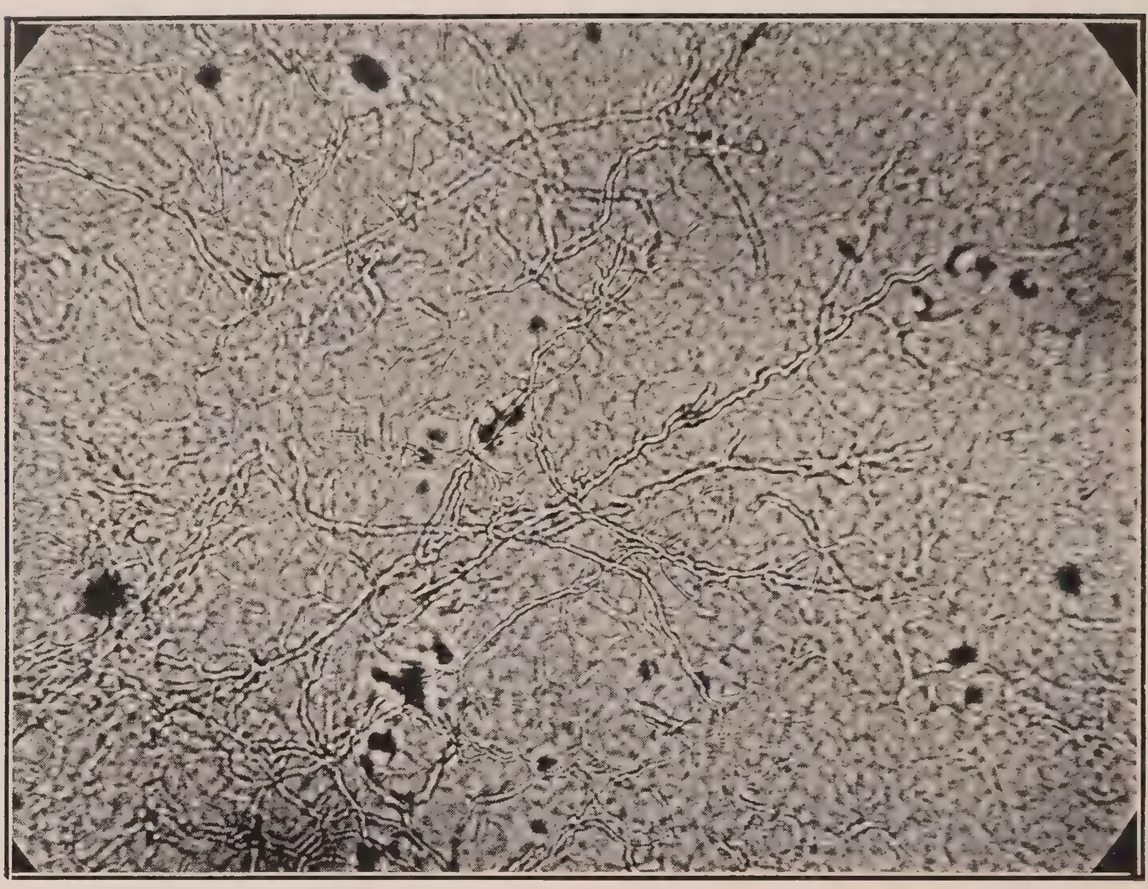


No. 1.
Showing the mycelium of the fungus in the scales.

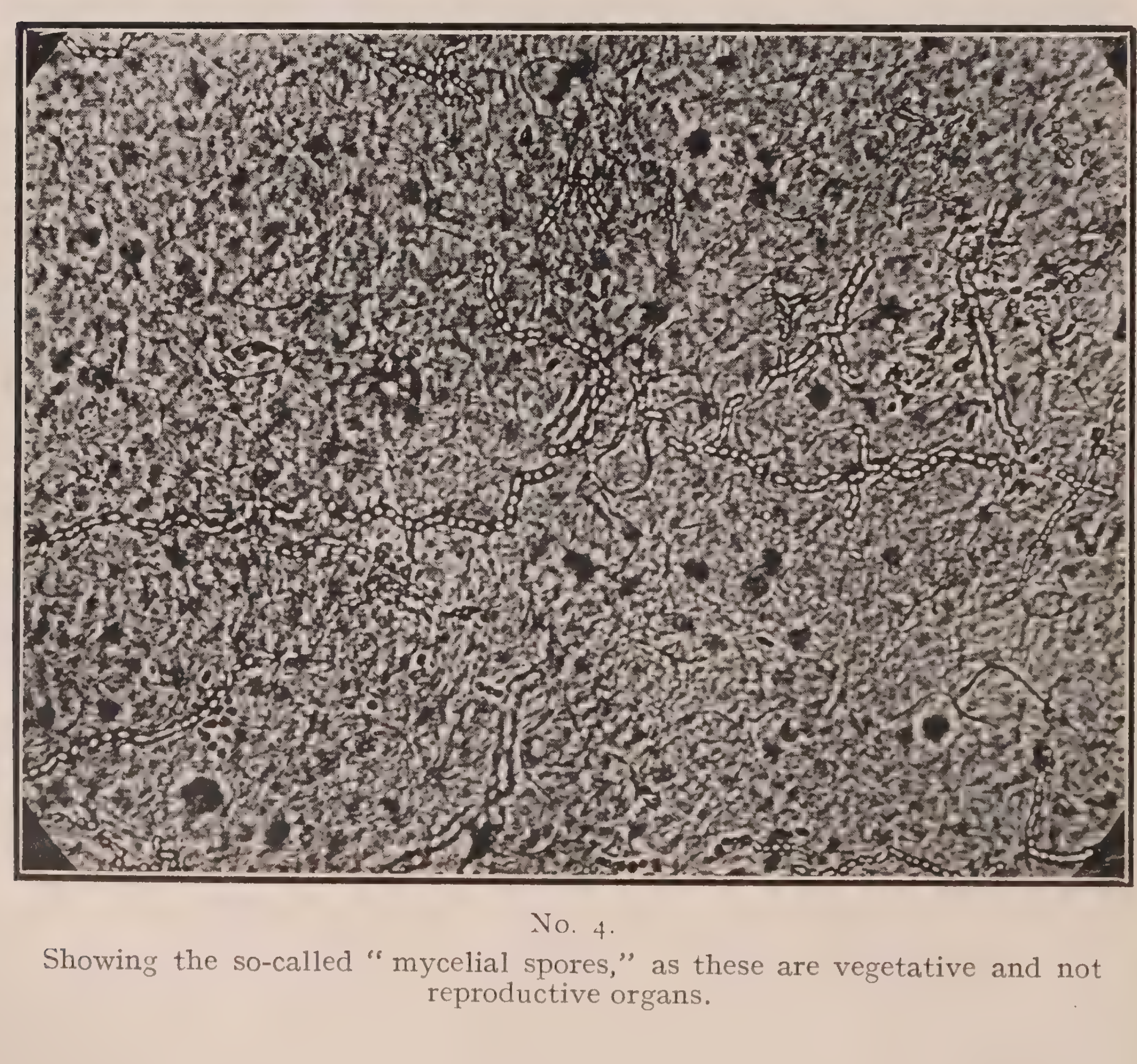


No. 2,
Showing the thick interlacing mass of the mycelium.

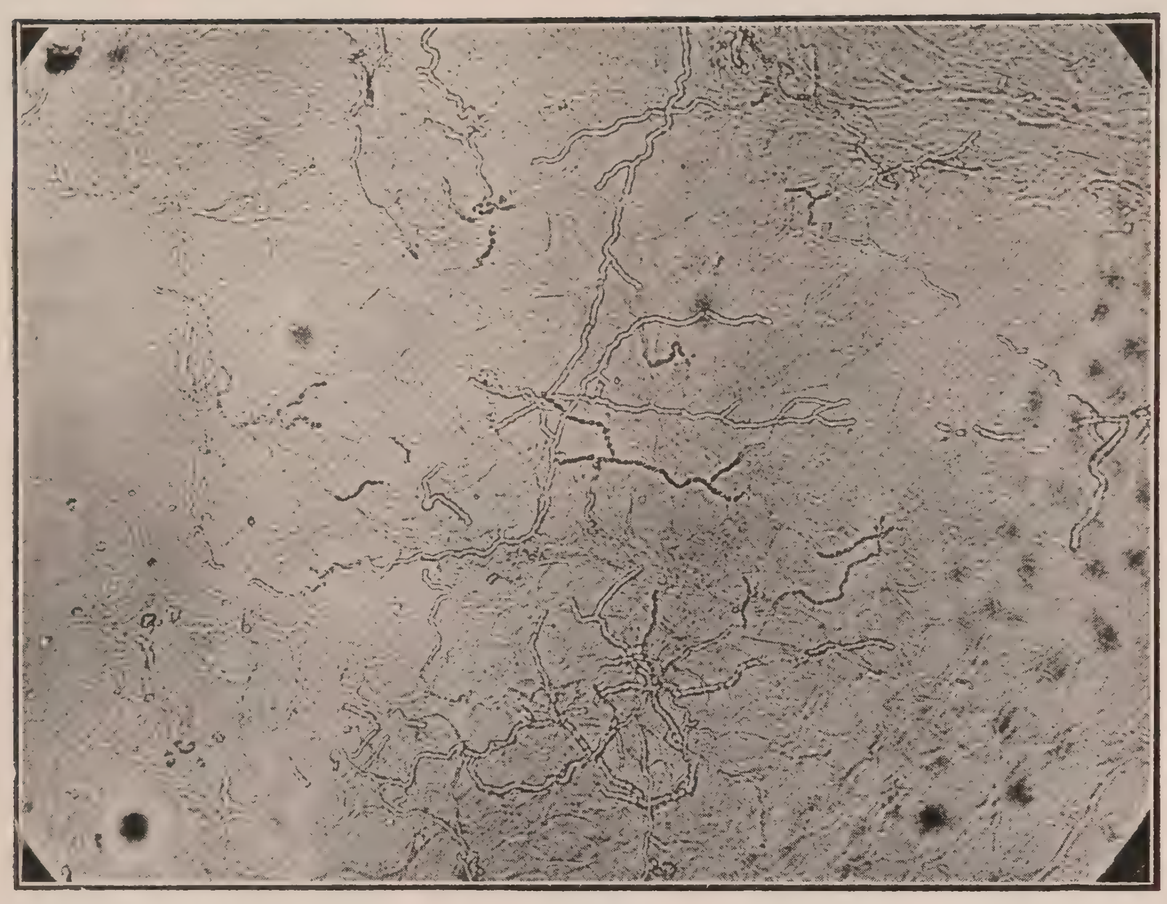
Nos. 1 to 10 to face page 632.]



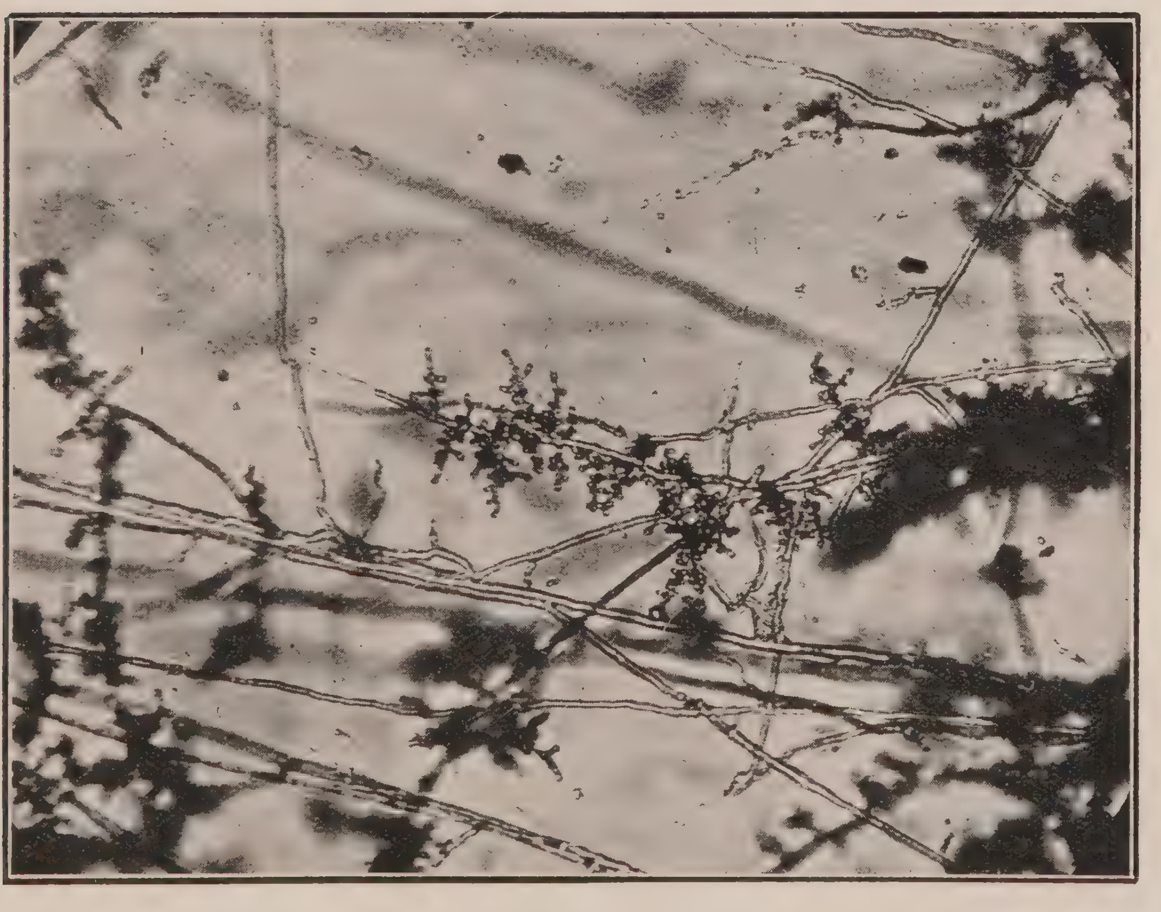
No. 3.
Showing mycelial filaments.



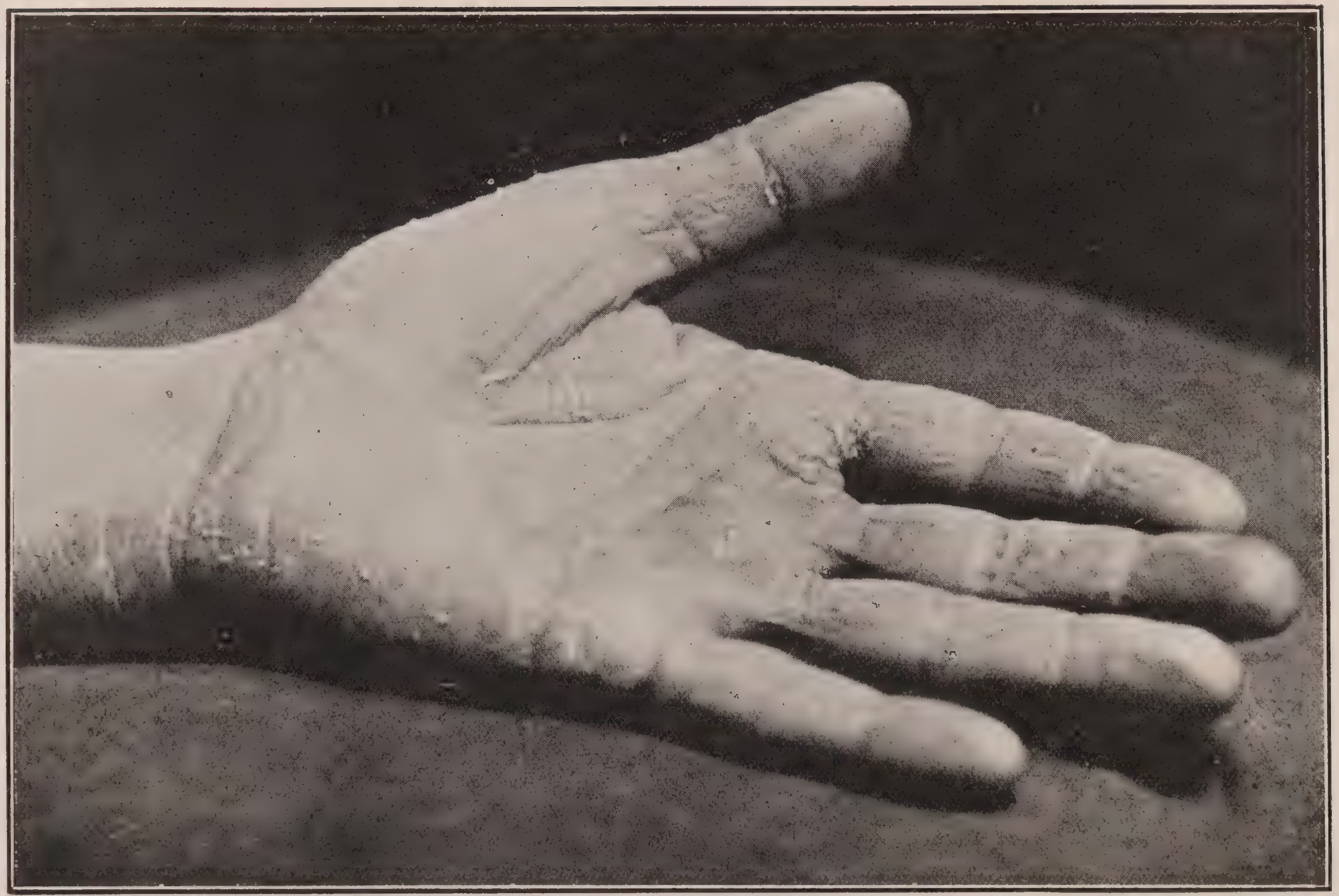
No. 4.
Showing the so-called "mycelial spores," as these are vegetative and not reproductive organs.



No. 5.
Showing the mycelium.



No 6.
Showing micro-photograph of a hanging-drop culture, illustrating hyphae with conidia supported on sterigmata.



No. 10.

Showing hand of patient with more severe type of the disease.

SECTION OF RHINOLOGY, OTOLOGY, AND LARYNGOLOGY.

THE TREATMENT OF ACUTE AND CHRONIC MIDDLE-EAR SUPPURATIONS.

By R. H. PULLEINE, M.B. (Syd. and Adel.)

I WAS called on at a late hour to preside over this section of Congress. Although I regret the circumstances which prevented our President elect being here, I feel proud in being chosen to fill the place of such an illustrious otologist. The late intimation that I was chosen to preside made it hard, as you will understand, to choose and prepare anything worthy of your acceptance as a presidential address. Such an address, as a rule, deals with the special subject historically or from the side of evolution or education, or else it records special investigations or new discoveries. Having nothing of this kind to offer to you, and looking round for a possible subject, it occurred to me to make some remarks on the treatment of acute and chronic middle-ear suppurations. These remarks I might call "Out of the practice for the practice." They do not pretend to be at all exhaustive; they avoid anything involving the subject of radical operations, and my only wish is that they should form material for discussion and the ventilation of the experience of others. This is the most valuable function of a Congress such as this. One really good hint is worth not only a whole paper, but may be worth all the time, trouble, and expense entailed in attending the meetings. The subject of acute middle-ear suppurations I shall deal with shortly, as it is with chronic forms that I am most concerned.

Compared with middle Europe—judging from what I saw there and from such authors as Ponfick—middle-ear suppuration is rare in the newly born; at least the otologist sees it rarely, but he sees it often enough to know of its existence. Moreover, he as a rule sees it when perforation has occurred and there is already mixed infection. Whether this infantile otitis is brought on by inspiration of liquor amnii during birth, or by early attempts at suckling, or other causes, is hard to make out; but when it does occur it seriously threatens the function of the ear, and may lead to deaf-mutism, causing, as it does, an arrest of development on the whole auditory mechanism.

It is well known to otologists that otitis in infants and children often passes unrecognized by practitioners, otherwise good physicians and surgeons, until pus appears at the meatus, and that even when it is recognized the advice is to wait until the abscess breaks, the pain being soothed by heat and alleged sedatives, which are too often ineffectual.

If any one fact in otology should be thoroughly taught to the medical student it is the importance of diagnosing acute otitis media, being able to detect an inflamed bulging membrane, and, following the indications, to open it efficiently in the right place, to the relief of pain and the conservation of function. Instead of this we know, unfortunately, that the average medical man can, as a rule, give no opinion of value on the state of the tympanum, and if by any chance he has a proper myringotome he is just as likely to strike the meatal wall as the membrane.

The application of kelene as a general anaesthetic we have found excellent in myringotomy in children and nervous people, whilst in ordinary adults an ear-bath of alypin and adrenalin, lasting half an hour, enables us to operate quite painlessly. A blast from the Politzer's bag to clear the middle ear and test the efficiency of the opening, followed by packing with formidine ribbon gauze and an external protective pad, completes the operation.

To prevent recurrence and chronicity in children it is necessary to investigate and treat the mouth and naso-pharynx, as the presence of dental or pharyngeal infection or interference with tubal ventilation and drainage may upset all our calculations for a rapid cure. In ear-suppurations the dentist can help us a great deal, and I have often noted the rapid improvement following thorough attention to the mouth.

I think you will agree with me that the important point in acute suppurations is to push the treatment ; attend to everything personally ; dress the ear twice a day for a few days, and leave nothing to chance ; avoid the syringe ; use a good loose wick drain and an efficient absorbent pad. We can then at least be conscious of having done what can be done to avoid mixed infection and its accompanying complications, and the ultimate lapse into a chronic disease. I am strongly opposed to sending the patient away with drops and advice to use a syringe. This, unfortunately, seems to be a common procedure even in large centres where otologists are readily available; and they, as a class, should lose no opportunity to fearlessly express their views on this subject to the general practitioner. To take one instance alone, I cite the use of hydrogen peroxide in acute ear-conditions, so favoured in Australia. I am convinced that this frequently is the cause of extension to the mastoid, and occasionally leads to a tragedy.

To men engaged in our specialty of oto-laryngo-rhinology the treatment of chronic middle-ear suppurations undoubtedly provides the largest amount of material. The care and treatment of these cases, and their complications, often entail great responsibility, and frequently much anxiety. No otologist has practised long without seeing swift and unexpected calamities arise in the course of middle-ear suppurations of mild intensity and long duration. Truly, people with this complaint live on a volcano, and meningitis or intracranial abscess may be their lot.

The titles on the agenda paper of this meeting show the importance of the subject, and it is well to review any methods, new or old, which may help us to forestall these dangers.

The methods I shall mention represent the maximum of conservatism, and my remarks will not include the class of case where, from extensive bone-disease, cholesteatoma vera, or other causes, radical operation is inevitable. It does, moreover, embrace those where per-meatum operations, ossiculectomy, and opening-up of the attic can be carried out. The following, then, is the scope of matter for consideration : (1) Suppurations of the mucosa of the middle ear and adnexa ; (2) suppurations of these, with caries of ossicles ; (3) attic suppurations, capable of approach without radical measures. These conditions, at any rate in our dry climate in Australia, form the great mass of our material, and extensive caries of the capsule and true cholesteatoma are of rare occurrence.

We may disregard tubal conditions as such, as they cannot be readily diagnosed, and are reached by the treatment employed. I have never yet found the tube totally and persistently occluded in a suppuration.

A point in the preparation of the ear for treatment, apart from removal of polypi, ossicles, &c., is the tumidity of the promontorial wall; one often sees it pressing forward like a polyp through a large tympanic defect, with pus oozing out all round where it comes in contact with the remains of the membrane. This tumid tissue cannot be removed, and until it is reduced little progress can be made. Under adrenalin it shrinks remarkably, and the application of pine trichloracetic acid while it is contracted will prevent the recurrence of tumidity and open up the periphery.

The first consideration is the cleansing of the tract. The means at our disposal are syringing, suction, and per-tubal lavage. Syringing with water containing a pus solvent is very useful as a preliminary method, though it is seldom available for the whole tract, and if it does happen to wash the Eustachian tube out it is from the wrong direction. On the whole, it cannot be considered an efficient method. Suction is very useful where there is a thick and gelatinous discharge ; coming from a relatively small opening with a well-fitting speculum and a strong minus pressure the middle ear can be efficiently emptied.

But there is a class of chronic suppuration where the whole middle ear is clogged with pus and epithelial debris, where the attic, the antrum, and the Eustachian tube are filled with organisms and diseased secretions. In such cases pus may be seen escaping from the tuba into the pharynx. In such a condition I prefer per-tubal lavage, the latter alone being unsatisfactory. It is carried out as follows, and with a good assistant is not difficult in technique. I use the hypress blower attached to the intratracheal anaesthetic apparatus. To the blowing-end I attach a tube leading to a wash-bottle containing the cleansing-fluid, which in turn is filled with a tube and catheter. To the intake of the hypress is attached another rubber tube (by means of rubber cork and glass tubing), which goes to a second wash-bottle in which neither of the glass tubes reach far beyond the cork. To this bottle again is attached a tube and a Siegel's speculum. As soon as the catheter and Siegel are in their respective positions the blower is set going, and lavage and suction take place simultaneously, and with very little discomfort to the patient. With the catheter in good position little fluid escapes into the pharynx, and the cleansing effect is highly satisfactory, especially where there are epithelial masses. Several ounces of soda or saline solution can be run from bottle to bottle in as many minutes, and the result of the washing seen in an exhausting flash. Although tedious at first, the method presents little difficulty as the operator and his assistant become perfected in the technique. Previous to the lavage an ear-bath of adrenalin and alypin to anaemize the tissues may render the process more efficient.

I can also strongly recommend the preliminary ear-bath (say, half an hour) of hydrogen peroxide to break up, or warm acid glycerin of pepsin to digest secretions.

A most efficient astringent and disinfecting ear-bath in the absence of secretion is aluminium acetate—solution, 1 in 24. The lavage over the tract may be dried, after using tampons, by attaching the electric heater to the hypress blower and blowing through the catheter or into the meatus. With a temperature of about 130° F. the moisture is rapidly carried off and the ear rendered relatively dry. The next thing is to keep it dry. Until a few months ago the dressing used in our polyclinic was formidine gauze ribbon, one end (the proximal) of which was dipped in alum dissolved in aniline. This is anhydrous, and as good as anything I have tried.

In the *Journal of the American Medical Association* for the 21st June, 1913, Dr. E. J. Brown, of Minneapolis, contributed a paper on the use of hot air and iodine in the treatment of suppurations. This paper was suggested by an article by Dr. C. J. Koenig, of Paris, on iodine fumigation, which appeared in the *New York Medical Journal* on the 2nd March, 1912. I have not seen the latter contribution.

The iodine vapour (wrongly called by Brown "nascent iodine") is obtained by dissociation by heat of an iodine containing compound such as iodoform, which breaks up at a relatively low temperature, giving off at first a red vapour of volatilized iodoform and iodine, which, as the heat increases, becomes dark-purple or nearly black, and deposits as a fine coating of purest iodine. Dr. Brown's apparatus is crude and home-made, but apparently quite efficient. With the kind assistance of Mr. Rogers, of the Adelaide University, I was able to work out a suitable apparatus, which I exhibit. This has two attachments —one to the blower, to provide the air; the other to electric supply, to heat the platinum coil and volatilize the iodoform. The technique is as follows: The ear having been cleansed and dried with hot air, iodoform is placed in the coil, and the apparatus is introduced into the meatus through a speculum. Air is now passed gently into the ear, and, as the contact button is pressed, the iodoform begins to volatilize, first as red fumes then as purple iodine fumes. If the dissociation is not carried further than the red fumes the treatment is less efficient, but not painful. When the iodine itself is allowed to deposit in the ear a somewhat severe pain may or may not come on and last for five or ten minutes. This does not occur if the alypin bath has been used, and generally only during the first two or three applications. The whole thing only takes a minute to do, and on looking into the ear the tympanic area and the meatal wall are dark-purple or black with the deposited iodine.

The frequent taste of iodine in the mouth shows that the vapour after invades the tube; on one occasion I saw a part of the vapour escape from the nares. No dressing is used, as the confined iodine would produce blistering. I have never seen blistering of the meatal wall occur.

Before giving my personal experience of this treatment we might ask what we might theoretically expect from it. Iodine has been and is still considered to be our most efficient disinfectant. If we can introduce infinitely fine particles of iodine in a heated and active condition into a reasonably dry cavity where it can remain for a time as a deposit, we might expect even the first application to be deadly to the bacterial flora, and that several applications would practically annihilate it. This is what apparently happens if proper care has been taken to open up and remove cavities or tissues where foci of suppuration exist; one might say this will happen, anyhow, if that is done. Quite right; but in practice it often takes such a long time that otologist and patient may become wearied, and none of us care for confirmed chronics. Without citing cases, my experience during the last six months has been as follows: The time required for the treatment of chronic suppurations coming within the scope laid down has been remarkably shortened. More effect has been got from one insufflation of iodine into a properly prepared ear than we were accustomed to get after several dressings formerly. Secretion drops to a minimum at once, and becomes inodorous and dries into scales. Improvement in hearing is more rapid than we were accustomed to under the old method. Several cases of otitis that seemed to have passed beyond the limits of conservative treatment have been brought within it, and apparently permanently.

Objectively and subjectively I think I can recommend the method as a distinct therapeutic advance. It is singularly effective in early tubercular otitis (from my experience in three cases); and tubercular otitis is usually stubborn and progressive. The same principles of treatment can be extended to the sinuses, and a remarkable diminution in secretion is the immediate result.

A properly bent Eustachian catheter will convey the vapour to the frontal sinuses with or without preliminary resection of the concha, while the ordinary canula will convey it to the maxillary antra. The important point is to dry out with the hot air before the insufflation.

The final step, suppuration having stopped, is to close the membrane. Unfortunately, at times, owing to the defects being too large and too peripheral, this is beyond our power, but a large central or paracentral perforation often closes in gradually if its edges are carefully touched with anhydrous trichloracetic acid.

Important points in technique are—(1) The acid should be anhydrous; (2) there should be destruction of only the epithelium surrounding the perforation; (3) the applications should be about fourteen days apart; (4) a covering of rubber tissue should be put over the perforation after application (this is often a great assistance).

VACCINE TREATMENT OF OZOENA.

By Dr. R. H. Pulleine (Adelaide),

President of the Section.

This is a short résumé of the results of experiment in the application of vaccine-therapy to the treatment of ozoena, or foetid atrophic rhinitis.

Some two years ago I noticed in the *British Medical Journal* that Dr. Porter had brought it up in Edinburgh, and I immediately wrote to him about it. The reply came from Dr. Ian Struthers Stewart, of Edinburgh, who was interested in the work.

In the meantime we were investigating the bacteriology, and Mr. Bull, of the State Pathological Laboratory, was able to find in the cases sent him a bacillus of the Friedlander group with more or less constant characters and reactions, and which apparently coincided with organism described by Abel as present in all cases of foetid atrophic rhinitis. We decided to make vaccines and go on. The bacillus had to be isolated from a number of other organisms—*Staphylococci*, *Streptococci*, *Pneumococci*, &c.—and in three cases we found that the patients were unconsciously diphtheria-carriers.

The vaccines were made for three cases in February, 1912, and administration of 12½ m. started every four days. This, we have since found, was too small a dose. However, the first series began at 12½ m. and rose to 50 m. in ten doses. The results were practically negative at the end of the series, and no local or general reaction having been noted, much higher doses were used, and altogether seven cases, of which details are appended, brought under treatment. These seven cases all received thirty-four injections of vaccine. First three cases—First series, 12½–50; second, 50–100; third, 100–250. Four cases—First, 50–100 (at four-day intervals); second and third, 100–250. In only one case (No. 3) was there any reaction; for three days after infection there was malaise, slight headache, and loss of appetite, lasting nearly up to the next injection. After cessation of treatment for a time, and sending her away for a holiday, she was able to go through the whole series.

The first result of treatment apparent was the drying of secretion. In two cases (Nos. 2 and 5) the secretion was of the moist form, extremely foetid in character. After the first series of injections these cases became dry, and the odour, which formerly was apparent on the patient coming into the room, was hardly apparent even on sitting directly in front of them, until the crusts were disturbed.

It is quite evident that some change takes place in the nasal secretion which leads to decrease of moisture and foetor. No investigations have yet been made to decide whether there is a disappearance of the Friedlander bacillus or a numerical diminution. The same form of bacillus was found in both facial types in which ozoena is met. I mean the more or less normal high-bridged nose in which the disease has appeared late, and the flat nose with key-hole nostrils in which it has appeared early.

All the cases under consideration were long-standing, with profuse crust-formation and marked atrophy, and free from sinus complication as far as we could see. The general effects of the injections on the whole series we can roughly state were, at the end of treatment: (1.) Crusting in all cases decreased, in one especially very markedly so; if we can say that the necessity for lavage twice daily is reduced to every second day I think we can claim reduction in crusting. (2.) Dessication of secretion in all cases. (3.) Reduction of foetor in all cases.

That the crusting does not cease even if we kill out a bacterial component is not at all strange. The absence of cilia over the whole surface allows a mechanical collection of glandular secretions on the surface. Such will occur after mechanical removal of the cilia from any cause. We are familiar with the little crust that forms on the anterior end of the septum on the site of an old ulcer of the mucosa. The whole trouble is, then, that the epithelial surface is altered, while the glands remain normally active, abnormally active, or pathologically active. The secretion exuded, and only capable of removal by mechanical means, blowing or lavage affords a culture-ground for a mixed flora, of which many of the common *Puscocci* and one fairly well-marked Friedlander bacillus are constant components.

Are we entitled to hope that if the so-called *Bacillus foetidus* can be controlled or annihilated the crusting will stop? For the present the method is only under trial, and there is still doubt about its permanency. If we can permanently reduce the crusts and the odour we shall have done something—a good deal, from the point of the patient.

In the series of seven cases of which notes are appended six came in to see me in December, and, although the last of the series had had no treatment for fourteen weeks, the improvement was maintained or even progressing objectively and subjectively.

I append after the notes a letter recently received from Dr. Ian Struthers Stewart, of Edinburgh.

Case 1.—B. D., Miss, nineteen. Nose, normal type. Bad-smelling crusts in nose since about tenth year. Pharynx slightly affected. Fair amount of atrophy. Crusts dry, adherent. Vaccines, 25–500 m. at four-day intervals, with slight breaks.

6/8/13: Much improved; no odour; practically no crusting; throat well.

Case 2.—L. S., Miss, twenty-seven. Nose obstructed for years from time to time with foetid crusts. Anosmia totalis. Brother and sister had antrum suppuration. O.E. flat nose; pale pasty complexion; intense foetor; massive moist secretion with channelled crusts.

10/2/13: Vaccine, Abel's bacillus autogenous 25 million, no reaction, followed by second and third series to 500 million. 6/8/13: No odour unless crusts disturbed, then slight; crusts dry and sparing, even after no washing-out for three days.

Case 3.—E. G., Mr., twenty-five. 20/2/13: Accumulation of crusts, which smell very offensive; five years' duration. Father formerly had sinular condition; still conscious of odour in own nose. Well-shaped nose, wide on right side, narrow on left; foetid crusts in roof on each side. Began autogenous vaccine 25/2/13, with 25 m., and received three series to 1,000 m.

9/12/13: Still some crusting; washes out once or twice weekly. Subjectively, much improvement.

Case 4.—C. J. H., Mr., twenty. Since fourteenth year has been troubled with crusts in nose and catarrh in nose; worse in summer. Grandmother had crusts forming in top of throat. High form; much atrophy of inferior turbinate; pharyngeal wall shiny, with small adherent crusts.

1/3/13: First autogenous vaccine 25 m., three series to 500 m. 6/11/13: Still some crusting; no odour; throat still troublesome.

Case 5.—G. M., Mr., eighteen. 5/5/13: Excessive foetor from nose; blows out crusts; pains over eyes; duration, many years. One brother sinular disease. Nose, normal; high bridge. O.E., extensive crusting of moist variety in nose and pharynx. Foetor very marked and nauseating.

12/5/13: Report Pathalogical Laboratory states: Abel's bacillus, with an abundant growth of an anaerobe. Vaccine commenced with 50 m., series to 250 m. given, went away and third series given in W.A. combined with vaccine from anaerobe. No report.

Case 6.—C. R., Miss, forty-five. 25/3/13: Since seventh year has had catarrh of nose, with bad-smelling crusts (one cousin, now dead, had the same). Anosmia totalis. Thin pallid woman. Nose, flat type, with crusts in roof of nose and on posterior wall of pharynx; pharyngeal mucosa, dry and shiny; same condition spreads into larynx, giving rise to attacks of aphoma.

4/6/13: Vaccines, 25 m. begun. Complains of feeling weak and dizzy after a few hours. Break in treatment after first series, as she was losing weight. Third series to 500 m. terminated in October, 1913.

6/12/13: Putting on weight; almost complete absence of crusts; no odour; still complains much of dry pharynx and larynx.

Case 7.—A. M. B., Miss, fifteen. Discharge and odour from nose for over a year, getting worse. Eldest sister had nasal complaint for ten years, but is now better. Early type of atrophic, with normal nose, well-marked crusts on posterior ends; atrophy not marked.

20/6/13: Began 25 m. autogenous vaccine. 25/9/13: Had reached 1,000 m. 20/11/13: No odour to speak of; crusting not marked.

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13 Castle Terrace, Edinburgh,
25th December, 1913.

DEAR SIR,—

Thank you for your letter, which I much regret has been left so long unanswered, but I have been ill. I hope this may reach you in time.

In a very high percentage (90 per cent.) of the cases diagnosed clinically as ozoena I have found a bacillus, giving very similar, if not identical, reactions to those of Abel's bacillus. I have not found it always in pure culture; it has been associated often with *Staphylococcus*, *Streptococcus*, *Micrococcus catarrhalis*, and, much less commonly, with the *Pneumococcus*. All the cases I have had have been treated with autogenous vaccines, using only the Abel's bacillus.

I agree with you that a large number of inoculations are necessary. Our results have been satisfactory on the whole. Crusting and foetor have disappeared fairly rapidly, but, unless the injections are continued for some time, recurrence is apt to take place. Children seem to do specially well.

The dosage I have employed has varied from 100,000,000 bacilli to 1,000,000,000 bacilli. Experience has shown that anything less than 100,000,000 bacilli is practically useless.

By careful sterilization of the vaccine at a low temperature, with the addition of 5 per cent. of carbolic acid, toxic symptoms have been avoided.

I am working at present on some of the serum reactions in this disease, but have not enough material yet to give results.

Yours sincerely,
IAN STRUTHERS STEWART.

FRIEDLANDER GROUP OF BACTERIA.—BACTERIOLOGICAL EXAMINATION OF MATERIAL FROM CASES OF ATROPHIC RHINITIS.

By LIONEL B. BULL, B.V.Sc.,

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FROM time to time material from cases of atrophic rhinitis has been forwarded to this laboratory for bacteriological examination, with a view to the preparation of an autogenous vaccine. Primary inoculation was in most cases done upon Loeffler's blood-serum in order to detect the presence or otherwise of *B. diphtheria*. In the majority of cases pure cultures have been obtained from the primary inoculation. The growth was sticky and colourless, usually being extremely moist, and running down the surface of the serum to the bottom of the tube.

The organism was rod-shaped, capsulated, non-motile, and Gram negative. It grew easily on primary and subcultures on any of the ordinary laboratory media. The organism was provisionally called *Bacillus ozoenae* (Abel), and an easy means of differentiating it from *B. pneumoniae* (Friedlander) and other organisms of the Friedlander group was sought.

At first stab cultures were made on gelatine, and only in one case (Dr. S., A—s, the material not being from a typical case of ozoenae) did one get the typical nail-culture of the Friedlander bacillus. In the other cases the surface growth spread out on the gelatine.

Fermentation reactions were said by Page* to offer an easy and definite means of differentiating *B. pneumoniae* from *B. ozoenae*. It was therefore decided that fermentation reactions should be tried. Only five sugars were used in the tests. The results of these tests have been very disappointing as a means of easy differentiation.

It is generally recognized now that *B. ozoenae* (Abel) can no longer be regarded as the cause of atrophic rhinitis; and, indeed, it would seem that *B. ozoenae* can no longer be regarded as a separate species.

The general fermentation reactions obtained in the tests are set out in Table I. There were seventeen cultures in all tested, representing material from fourteen different cases. In three cases two cultures from the same material were used, each being taken from isolated colonies on plates.

Plates were always made from the primary cultures, and several colonies from each plate were inoculated on to agar slants, each subculture being tested with the sugars. In the majority of the cases all the organisms taken from the same plate showed the same fermentation reactions, but in three cases there was slight variation in the individual subcultures.

The results given in the table have been confirmed by repeating the tests several times. Of the seventeen subcultures tested, nine showed fermentation of all the sugars, six did not ferment any of the sugars, and in two the results were irregular.

The fermentation tests were conducted as follows: Sugar-free broth was prepared by making meat-infusion broth in the usual manner, inoculating the broth with *B. coli communis*, and incubating at 37° C. for eighteen hours, heating thoroughly to kill bacteria, filtering through a Berkefeld filter, determining weight and adjusting, determining volume, titrating and adjusting to neutral. Then proceeding in the usual way. The broth was then added to test-tubes, in which small Durham tubes were inverted, and sterilized in the autoclave. The sugars were made up in 10-per-cent. solutions in sterile water, and sterilized in the Arnold sterilizer.

Before use approximately 1 per cent. of the sugars were added to each tube with a sterile pipette. The tubes were then sterilized in the Arnold sterilizer for ten minutes. Each tube was inoculated with a small loopful from agar-cultures, and incubated at 37° C.

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* Page, C. G. "*Bacterium ozoenae* (Abel): Fermentation Reactions with Eleven Sugars, Differential Diagnosis, and Use as a Vaccine for Treatment," *Journal of Medical Research*, July, 1912, vol. xxvi, No. 3.

Details of the fermentation reactions and general cultural characteristics are as follows :—

Dr. T. K. H. (*Case No. 1*).—Mannite, fermentation commenced overnight, showing $\frac{1}{10}$ of gas in sixteen hours,* increased to $\frac{1}{8}$ in twenty-four hours, and $\frac{2}{3}$ in three days. Dextrose, fermentation overnight, showing $\frac{1}{6}$ of gas in sixteen hours, $\frac{1}{4}$ in twenty-four hours, and slightly over $\frac{1}{3}$ in three days. Dextrin, fermentation overnight, showing $\frac{1}{7}$ of gas in sixteen hours, $\frac{1}{6}$ in twenty-four hours, $\frac{1}{4}$ in three days, and over $\frac{1}{3}$ in four days. Saccharose, fermentation commenced in sixteen hours, increased slightly in twenty-four hours, increased to $\frac{1}{3}$ of gas in three days, $\frac{1}{5}$ in five days, and nearly $\frac{1}{3}$ in six days. Lactose, fermentation commenced in four days, increased to $\frac{1}{10}$ of gas in five days and $\frac{1}{6}$ in seven days. Litmus milk showed no reaction after ten days' incubation.

Dr. T. K. H. (*Case No. 2*).—There was no fermentation in any of the sugars after fourteen days' incubation. The media became quite thick and jelly-like. Litmus milk became thick in four days, and clotted in five days.

Dr. T. K. H. (*Case No. 3*, i).—Mannite, fermentation rapid overnight, showing $\frac{1}{3}$ of gas in sixteen hours, increased to $\frac{2}{3}$ in twenty-four hours, and $\frac{3}{4}$ in three days. Dextrose, fermentation rapid overnight, showing nearly $\frac{1}{2}$ of gas in sixteen hours, increased slightly in twenty-four hours. Dextrin, fermentation commenced in sixteen hours, showing $\frac{1}{6}$ of gas in twenty-four hours, then no increase until fifth day, when it showed $\frac{1}{4}$. Saccharose, fermentation commenced in sixteen hours, increased slightly in twenty-four hours, to $\frac{1}{8}$ of gas in three days, and $\frac{1}{6}$ in five days. Lactose, fermentation commenced in five days, increased to $\frac{1}{4}$ of gas in six days, and over $\frac{1}{3}$ in seven days. Litmus milk showed no reaction.

Dr. T. K. H. (*Case No. 3*, iii).—This subculture, taken from same plate as previous one, showed slight variation—viz., the fermentation of dextrin was very small, showing only a bubble in twenty-four hours, which did not increase ; fermentation of lactose commenced in six days, and increased only slightly in eight days.

Dr. S. A—s.—This organism was isolated from a nose-swab, but the case was not a typical atrophic rhinitis. It possessed more of the general characteristics of *B. pneumoniae* than any of the others. Mannite, fermentation commenced overnight, showing $\frac{1}{10}$ of gas in sixteen hours, increased to $\frac{1}{7}$ in twenty-four hours, and $\frac{3}{4}$ in three days. Dextrose, fermentation commenced overnight, showing $\frac{1}{10}$ of gas in sixteen hours, increased to $\frac{1}{5}$ in twenty-four hours, and $\frac{2}{3}$ in three days. Dextrin, fermentation commenced in sixteen hours, increased slightly in twenty-four hours, showing $\frac{1}{10}$ of gas in three days. Saccharose, fermentation commenced in sixteen hours, increased slightly in twenty-four hours, showing $\frac{1}{9}$ of gas in three days, and $\frac{1}{8}$ of gas in five days. Lactose, fermentation commenced in five days, showing $\frac{1}{5}$ of gas in six days, and nearly $\frac{1}{3}$ in seven days. Litmus milk became slightly acid, but no clot.

W—d (*i*).—There was no fermentation in any of the sugars after fourteen days' incubation. Litmus milk became slightly acid, but no clot.

W—d (*ii*).—Dextrose was the only sugar fermented. Fermentation commenced in four days, showing $\frac{1}{10}$ of gas in five days, and $\frac{1}{7}$ in six days. Litmus milk became alkaline. This organism was isolated from a single colony on the same plate as W—d (*i*). Therefore it seems that organisms springing from the same stock are capable of variation. This variation has remained constant through subcultures.

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* Measurements are arbitrary and approximate, the amount of gas in the Durham's tube being taken as a fraction of whole length of tube. The capacity of tubes varied, so that measurements are only of use for detecting increase.

B—s (*ii*).—There was no fermentation in any of the sugars after fourteen days' incubation. Litmus milk became alkaline.

L—g.—There was no fermentation in any of the sugars after fourteen days' incubation. Litmus milk became alkaline.

Dr. F. N—t.—Mannite, fermentation commenced overnight, showing $\frac{1}{8}$ of gas in sixteen hours, $\frac{1}{6}$ in twenty-four hours, and nearly $\frac{1}{2}$ in three days. Dextrose, fermentation commenced in sixteen hours, increased slightly in twenty-four hours, showing over $\frac{1}{3}$ of gas in three days. Dextrin, fermentation commenced overnight, showing $\frac{1}{10}$ of gas in sixteen hours, increased slightly in twenty-four hours, and no further increase. Saccharose, fermentation commenced in sixteen hours, increased slightly in twenty-four hours, showing $\frac{1}{10}$ of gas in three days, and $\frac{1}{7}$ in four days. Lactose, fermentation commenced in four days, increased slightly in five days, showing $\frac{1}{10}$ of gas in six days, and $\frac{1}{6}$ of gas in eight days. Litmus milk became very slightly acid.

Dr. F. M—e.—Mannite, fermentation commenced in sixteen hours, showing $\frac{1}{10}$ of gas in twenty-four hours, and $\frac{2}{3}$ in three days. Dextrose, fermentation commenced in sixteen hours, increased slightly in twenty-four hours, showing nearly $\frac{1}{2}$ of gas in three days. Dextrin, commenced overnight, showing $\frac{1}{8}$ of gas in sixteen hours, increased to $\frac{1}{6}$ in twenty-four hours. Saccharose, fermentation commenced in sixteen hours, increased slightly in twenty-four hours, showing $\frac{1}{10}$ of gas in three days. Lactose, fermentation commenced in four days, showing $\frac{1}{4}$ of gas, increased to $\frac{2}{3}$ in five days. Litmus milk showed no reaction, or very slightly acid.

Dr. P. B—d.—There was no fermentation in any of the sugars after fourteen days' incubation. Litmus milk became alkaline.

P—s.—Mannite, fermentation commenced overnight, showing $\frac{1}{3}$ of gas in sixteen hours and $\frac{1}{2}$ in two days. Dextrose, fermentation commenced overnight, showing $\frac{2}{3}$ of gas in two days. Dextrin, fermentation commenced in sixteen hours, showing $\frac{1}{10}$ of gas in two days. Saccharose, fermentation commenced in sixteen hours, showing $\frac{1}{6}$ of gas in two days, increased slightly in three days, over $\frac{1}{3}$ in four days, and $\frac{1}{2}$ in six days. Lactose, fermentation commenced in five days, showing $\frac{1}{10}$ of gas, which increased to $\frac{1}{3}$ in six days. Litmus milk showed no reaction.

Dr. S. S—z.—There was no fermentation in any of the sugars after fourteen days' incubation. Litmus milk became slightly acid.

Dr. S. D—s.—Mannite, fermentation commenced overnight, showing $\frac{1}{7}$ of gas in sixteen hours and $\frac{1}{3}$ in two days. Dextrose, no fermentation of this sugar. Dextrin, fermentation commenced in sixteen hours, increased slightly in two days. Saccharose, fermentation commenced in two days, showing $\frac{1}{6}$ of gas in three days. Lactose, fermentation commenced in two days, showing $\frac{1}{10}$ of gas, increased to nearly $\frac{1}{2}$ in three days, and to $\frac{1}{2}$ in four days. Litmus milk became acid and clotted on second day.

Dr. S. D—s (*ii*).—Mannite, fermentation commenced overnight, showing an infinitesimal quantity of gas in sixteen hours, which did not increase. Dextrose, fermentation was slow and feeble, commenced in two days, showing $\frac{1}{10}$ of gas. Dextrin, fermentation commenced in sixteen hours, showing $\frac{1}{10}$ of gas in two days. Saccharose, fermentation commenced in two days, showing $\frac{1}{7}$ of gas, which increased to $\frac{1}{5}$ in three days. Lactose, fermentation commenced in two days, showing $\frac{1}{7}$ of gas in three days, increased to $\frac{1}{4}$ in four days, and to $\frac{1}{3}$ in five days. Litmus milk became acid and clotted on second day.

Dr. F. S—t.—Mannite, fermentation commenced overnight, showing $\frac{1}{10}$ of gas in sixteen hours, increased slightly in twenty-four hours. Dextrose, fermentation commenced in sixteen hours, was very feeble, giving an infinitesimal quantity, which did not increase. Dextrin, fermentation commenced overnight, showing $\frac{1}{10}$ of gas in sixteen hours. Saccharose, fermentation commenced in sixteen hours, showing $\frac{1}{10}$ of gas in twenty-four hours. Lactose, fermentation commenced in twenty-four hours, showing $\frac{1}{8}$ of gas in three days, increased to nearly $\frac{1}{3}$ in five days, and $\frac{2}{3}$ in six days. Litmus milk became acid, and clotted in three days.

The results of these fermentation tests are summarized in Table 2. The time at which fermentation began, and the time and amount of gas produced, are briefly stated. Only the cultures fermenting the sugars are given.

Fermentation commenced in all the sugars except lactose in every case with the exception of W—d (ii), and Dr. S., D—s (i) and (ii), in from twelve to sixteen hours.

Page came to the conclusion that *B. ozoenae* (Abel) was to be differentiated from *B. pneumoniae* (Friedlander) by the pronounced delay it showed in fermenting the same sugars as the latter. His results for the same sugars as used in the foregoing tests are, briefly, as follows: *B. pneumoniae* ferments all the sugars rapidly except lactose and dextrin. Fermentation of lactose commences on the second day, showing 20 per cent. of gas on the ninth day. Fermentation of dextrin commences after twenty-four hours, showing 5 per cent. of gas on the fourth day.

B. ozoenae ferments the sugars more slowly. Mannite shows 5 per cent. of gas overnight, increasing to 90 per cent. on the second day. Dextrose shows slight fermentation in twenty-four hours, increasing rapidly, and showing 60 per cent. on the second day. Dextrin shows slight gas on second day, increasing slowly, showing 20 per cent. of gas on seventh day. Saccharose commenced between fourth and fifth days, increasing rapidly to 75 per cent. of gas on the seventh day. Lactose shows prolonged delay, usually commencing between seventh and eighth days, showing 60 per cent. of gas on the tenth day. Page found that although the amount of gas varied slightly in different subcultures, delay in the beginning of gas-production with certain sugars was constant. Page classified the organisms according to the time taken in fermenting the sugars. He states that mannite is perhaps the most striking and useful, because differentiation can be made overnight.

If one follows Page's classification none of the organisms isolated can be classed as *B. ozoenae*. Also none of them ferment the sugars as *B. pneumoniae* did in Page's experiments. This is most marked in the case of dextrin, the majority of the cultures fermenting this sugar within sixteen hours, whereas Page found that *B. pneumoniae* commenced to ferment this sugar after twenty-four hours.

Probably the most interesting cultures we have dealt with in this series of examinations are those which failed to ferment any of the sugars. For the most part, these may be put under one head, for they have common characteristics in not fermenting the sugars, and in turning litmus milk alkaline or very slightly acid. There is one exception to this—viz., Dr. T. K. H. (Case No. 2), which clotted the milk in five days, and which rendered the broth quite jelly-like after some days' incubation.

Another very interesting feature is the slight, but definite, variation present in cultures isolated from separate colonies on the same plate. This is most marked in W—d. (ii) and Dr. S., D—s (i).

From morphological and general cultural characteristics, also staining reactions, one must put all these organisms isolated from the various cases in the Friedlander group. The organisms fermenting all the sugars are probably all *B. pneumoniae*. Those organisms which fail to ferment any of the sugars must be put in a subgroup, but further classification is not possible at this stage. Much work remains to be done upon this very interesting group before any attempt at classification can be made.

There seems to be no doubt that *B. pneumoniae* is capable of variation both in its powers to ferment certain sugars and its reaction in litmus milk. Also other bacilli of the Friedlander group are capable of variation, as evidenced by the atypical strains isolated, and the variation found in organisms taken from the same plate. Page reports receiving a culture from Professor C. E. A. Winslow, marked "*B. pneumoniae*," which coagulated milk in two days, and made no gas in dextrin or adonite, and has therefore come to the conclusion that it was not the Friedlander bacillus.

It is doubtful if this conclusion be justified, and I take it that the variation present in this culture is only more evidence of the variation that this bacillus is capable of.

Page also reports variations in organisms he classes as *B. ozoenae*. Two cultures show greater delay (nine and fifteen days) in the fermentation of saccharose.

As illustrating further the variation that is possible in this group, the following might be mentioned: A swab from the throat was received from a local Board of Health. Culture media, after inoculation and incubation, showed a copious growth of *B. pneumoniae*. This culture was tested for fermentation reactions. It did not ferment mannite, dextrose, or lactose, but fermentation commenced in dextrin in three days, was very feeble, and gave an infinitesimal quantity of gas; fermentation commenced in saccharose in three days, and increased to $\frac{1}{10}$ in five days.

Much work has been done, and is still in progress, upon the etiology of atrophic rhinitis. Workers in Europe have isolated a bacillus, *Coccobacillus foetidus ozoenae*, which they say is the cause of atrophic rhinitis. The results obtained in this laboratory from examination of material from cases of atrophic rhinitis have shown that in every case a bacillus belonging to the Friedlander group can be isolated usually in pure culture. It appears then that the infection is not specific, but a group infection. The consideration of the cause of atrophic rhinitis is out of the domain of this paper. It would appear, however, that the infection is in many cases at least only secondary, for after vaccine treatment, though the bacilli may disappear completely from the nose, and improvement result, yet the original condition does not clear up.

Nothing need be said about the preparation of the vaccine, as it is simple, and requires no special consideration. The dosage is relatively fairly high. The initial dose used is 250,000,000. This is increased

50,000,000 in each successive dose up to 500,000,000, and continued at this. Lately doses as high as 1,000,000,000 have been given. Inoculations are given at four-days intervals.

Summary and Conclusions.

Examination of material from cases of atrophic rhinitis has given in every case a bacillus belonging to the Friedlander group.

Fermentation tests with five sugars have shown these organisms to vary considerably in their bio-chemical properties. Seventeen cultures were tested with the sugars. Nine showed fermentation of all the sugars, six did not ferment any of the sugars, and two showed distinct variation.

Organisms of the Friedlander group show considerable variation in their powers to ferment certain sugars.

Much more work is necessary before it can be stated that fermentation tests offer a means whereby the organisms of the Friedlander group can be differentiated.

In cases of atrophic rhinitis it would appear that the infection is only a secondary one, and it would appear also that the infection is not specific, but a group infection.

Autogenous vaccines have proved of value in treatment.

TABLE I.—GENERAL FERMENTATION REACTIONS OF CARBO-HYDRATES.

Name.	Mannite.	Dextrose.	Dextrin.	Saccharose.	Lactose.
Dr. T. K. H. (Case No. 1)	+	+	+	+	+
Dr. T. K. H. (Case No. 2)	−	−	−	−	−
Dr. T. K. H. (Case No. 3, i)	+	+	+	+	+
Dr. T. K. H. (Case No. 3, iii)	+	+	+	+	+
Dr. S. A—s*	+	+	+	+	+
W—d (i)	−	−	−	−	−
W—d (ii)	−	+	−	−	−
B—s (ii)	−	−	−	−	−
L—g	−	−	−	−	−
Dr. F. N—e	+	+	+	+	+
Dr. F. M—e	+	+	+	+	+
Dr. P. B—d	−	−	−	−	−
P—s	+	+	+	+	+
Dr. S. S—z	−	−	−	−	−
Dr. S. D—s, (i)	+	−	+	+	+
Dr. S. D—s, (ii)	+	+	+	+	+
Dr. F. S—t	+	+	+	+	+

* Organism was not from a typical case of atrophic rhinitis.

TABLE 2.—SHOWING TIME IN WHICH FERMENTATION BEGAN, AND THE AMOUNT OF GAS ULTIMATELY PRODUCED.

Name.	Mannite.	Dextrose.	Dextrin.	Saccharose.	Lactose.
Dr. T. K. H. (Case No. 1)	Overnight ; $\frac{2}{3}$ in three days	Overnight ; slightly over $\frac{1}{3}$ in three days	Overnight ; slightly over $\frac{1}{3}$ in four days	Sixteen hours ; nearly $\frac{1}{3}$ in six days	Four days ; $\frac{1}{7}$ in seven days.
Dr. T. K. H. (Case No. 3, i)	Overnight ; $\frac{3}{4}$ in three days	Overnight ; $\frac{1}{2}$ in three days	Sixteen hours ; $\frac{1}{4}$ in five days	Sixteen hours ; $\frac{1}{6}$ in five days	Five days ; slightly over $\frac{1}{3}$ in seven days.
Dr. T. K. H. (Case No. 3, iii)	Overnight ; $\frac{3}{4}$ in three days	Sixteen hours ; nearly $\frac{1}{2}$ in three days	Sixteen hours ; slight increase in twenty-four hours	Sixteen hours ; $\frac{1}{6}$ in five days	Six days ; slight increase in seven days.
Dr. S. A—s ..	Overnight ; $\frac{3}{4}$ in three days	Sixteen hours ; $\frac{2}{3}$ in three days	Sixteen hours ; $\frac{1}{10}$ in three days	Sixteen hours ; $\frac{1}{8}$ in five days	Five days ; nearly $\frac{1}{3}$ in seven days.
W—d (ii) ..	..	Four days ; $\frac{1}{7}$ in six days	..	..	..
Dr. F. N—t ..	Overnight ; nearly $\frac{1}{2}$ in three days	Sixteen hours ; slightly over $\frac{1}{3}$ in three days	Sixteen hours ; slight increase in twenty-four hours	Sixteen hours ; $\frac{1}{7}$ in four days	Four days ; $\frac{1}{6}$ in eight days.
Dr. F. M—e ..	Sixteen hours ; $\frac{2}{3}$ in three days	Sixteen hours ; nearly $\frac{1}{2}$ in three days	Sixteen hours ; $\frac{1}{6}$ in twenty-four hours	Sixteen hours ; $\frac{1}{10}$ in three days	Four days ; $\frac{2}{3}$ in five days.
P—s	Overnight ; $\frac{1}{2}$ in two days	Overnight ; $\frac{2}{3}$ in two days	Sixteen hours ; $\frac{1}{10}$ in two days	Sixteen hours ; $\frac{1}{2}$ in five days	Five days ; $\frac{1}{3}$ in six days.
Dr. S. D—s (i)	Overnight ; $\frac{1}{3}$ in two days	..	Sixteen hours ; slight increase in two days	Two days ; $\frac{1}{6}$ in three days	Two days ; $\frac{1}{2}$ in four days.
Dr. S. D—s (ii)	Sixteen hours ; no increase	Slight in two days ..	Sixteen hours ; $\frac{1}{10}$ in two days	Two days ; $\frac{1}{5}$ in three days	Two days ; $\frac{1}{3}$ in five days.
Dr. F. S—t ..	Overnight ; slight increase in twenty-four hours	Sixteen hours ; no increase	Sixteen hours ; no increase	Sixteen hours ; $\frac{1}{10}$ in twenty-four hours	Twenty-four hours ; $\frac{2}{3}$ in six days.

AUSTRALIAN EXPERIENCES OF HEATH'S METHOD IN PARACUSIS.

By Dr. Robertson.

After reading Heath's paper, and seeing the results in my first case, I imagined that at last the reproach of aurists had been removed. Later experience has caused me to modify that view. Whilst feeling that there is a great deal in what Heath teaches, and convinced that good can be done by this method, I have found the results and prognosis so uncertain that it seemed a good and fair thing to obtain the collective opinion of aurists in Australasia on the subject.

I sent out about eighty circulars* to men who were registered as members of the section at the late Congress in Sydney, and received thirty-three replies. Nineteen, for various reasons, had not tried the method, whilst fifteen had. The general tenor of the correspondence was pessimistic, and the statistics confirmed that attitude. Out of ninety cases treated by fifteen men, twelve only got benefit. Some writers got a much better proportion of good results than others, whether from more careful selection of cases or more careful technique I cannot say.

Personally, I have treated about thirty cases, but in a number my notes are not definite enough as to the end-results, and are therefore unavailable for this paper. My impression is that the result in these cases was poor. Out of eighteen cases in the subjoined list, three heard remarkably well, whilst five others were so much improved that conversation became a comfort. No case was definitely worse, and some of the worst cases tried to persuade themselves and me that they were really hearing better. A very little improvement makes all the difference to a business man who can hardly transact his business. My impression is that young people do best—that in those cases that will eventually improve you get increase in hearing-power during the first week of treatment, and that it is courting trouble to take on a case with a very narrow meatus. In one case I set up an acute dermatitis in the meatus, which effectually put a stop to treatment. Strangely enough, the lady heard distinctly better when the trouble cleared up, and her tinnitus was gone.

I must confess I am rather disheartened with the very scanty results obtained, but when one considers that these cases were practically untreatable by the old methods—in fact, were likely to be made worse—it makes me think that we should not abandon the method altogether, but be more careful both in selection of cases and in treatment. It is horribly wearying to both doctor and patient, but success means a new world to the sufferer. One must put the chances fairly before a patient and let him choose.

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* Through an error of my secretary, the Queensland men did not receive a circular. This I did not discover until too late.

Name.	Age.	Watch.		Voice.	After Treatment.		
					Watch.		Hears Voice.
		R.	L.		R.	L.	
		In.	In.		In.	In.	
Miss N.—							
After ten days' treatment	21	2	3	Shout	36	54	Well.
After full treatment ..	..	..	..	..	120	120	Normally.
Mrs. G.—R. ear treated by Heath slowly relapsed	51	..	3	Raised	..	15	Fairly.
Miss M.	25	2	10	,,	18	48	Well.
Mr. C.	50	1	1	,,	1½	3	Poorly.
Mr. A.	44	1	1	,,	1	3	A little better.
Miss T.	22	2	2	,,	18	24	At 2 ft.
Mr. W.	30	Not on contact		Shout	Contact		No better.
Mr. S.	21	12	24	Barely raised	26	120	Well.
Miss W.—No better first course; second course better	19	Contact		Shout	18	12	Raised.
Mrs. D.	47	C	½	,,	5	7	Very little better.
Miss A.—Treated only L. ear; relapsed to eighteen in six months	54	..	C	Raised	..	30	Well.
Miss W.—Deaf twenty years	39	¾	¾	Shout	6	11	Not much better.
Miss F.—Very blocked and catarrhal	21	3	3	,,	6	6	No better.
Mrs. O. F.—Frontal sinus case	49	1	C	Raised	8	6	Much better.
Miss N.—Attended irregularly two courses	21	3	½	,,	6	24	Fairly.
Mrs. H.	43	1	1	,,	1	½	No better.
Mrs. M.—Two courses ..	26	1	3	,,	6	3	Little better.
Master S.	20	3	2	,,	..	..	Well.

A number of these cases had undergone all forms of treatment previously. One case (the last cited) has been under my care from time to time for years. He first came to me very deaf, with nasal obstruction, adenoids, and enlarged tonsils. I cleared this all up, with very little benefit to the hearing. He had the catheter almost daily for six weeks with absolutely no benefit; then I gave him up. When I began Heath's treatment I thought of him. He was then learning engineering in a foundry, and could give me only a month. I did not see him again for two years, when I find he is at the university, able to attend his engineering lectures with profit. That means a lot to this boy.

My worst disappointments have been in men of middle age, who have tried everything and everybody, with no results. I have been quite unsuccessful with such. One lady of fifty-four got remarkable improvement in the ear treated, and I was much lifted up; but she has fallen away again from 30 in. to 18 in. in six months.

Case 2 is interesting: I sent her to Heath, and he treated the right ear forty-eight times. She got considerable improvement, but the hearing again slowly failed. On her return to Queensland I treated the left. There was little appreciable improvement after the first course, but a more satisfactory result after a second. That ear is also slowly going back. I have not the courage to try again, although the patient is willing. Tinnitus was much relieved in this case.

About Technique.—I usually begin with 1–6 solution. The weaker dilutions are, I fear, too slow for me. It is well to avoid blistering if you can. Any scum or epithelial accumulation on the membrane can be removed by gently "twiddling" a dressed probe, or loosened with the help of peroxide. A gelatinous fibrinous clot may form, which is best removed with Heath's blunt hook, or fine ear-forceps, after raising the edges. It is not a bad plan to smear the meatus with a thick ointment when the meatus is narrow. It is almost impossible to avoid touching the walls sometimes. During healing I let the patient cleanse the ear with peroxide, and drop in spirit. I do it myself for the first few days.

To conclude, I shall continue to try this treatment in young people, giving the indicated reactions where the need is great and all else has failed. I shall not try cases of too long-standing unless very hard pressed.

I have avoided going into Heath's fascinating physiological reasoning, as I imagine you have already read his paper on the subject.

DISCUSSION ON DR. ROBERTSON'S PAPER ON THE HEATH TREATMENT OF PARACUSIS.

Dr. **Hardie Neil** (Auckland), after congratulating Dr. Robertson on the frank and unbiased statement of his experiences, made a plea for the universal use of the international system of tests for acuity of hearing. The system had been devised by Grademigo, Politzer, and other equally eminent aurists at the request of the International Congress of Otology. It only required, of necessity, four common forks, and could be carried out with the necessary accuracy in fifteen minutes, including the voice and whisper tests. We taught that if the system of tests were used to control the results of new intrameatal treatment of properly diagnosed chronic non-suppurative middle-ear mischief, the world of aurists might be able to share the enthusiasm of some of the aggressive publicists in the speciality. The use of the spoken voice, which could not be depended on for pitch or intensity, was unsuitable for recording results in scientific journals. The whisper ought to be recorded by the distance at which a catch-word was heard when interpolated amongst numerals. Patients were often assisted in their interpretation of the latter by the syllable-content. A catch-word would reduce the hearing-distance sometimes by 50 per cent.

The continued local treatment of incurable cases of non-suppurative aural mischief tended to lower the speciality in the eyes of the profession and the public. The use of the international system would prevent unconvincing records being published, would diminish useless treatment, and, used as a routine, would allow of a free frank statement of the case to the patients, and so greatly limit the number of cases that drift off from professional care into the hands of the Crippen* class, who, by means of magazine advertisements, batten on the unfortunate and ill-advised deaf.

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* It came out in evidence that Crippen was the personality behind the Keith or some other such deafness institution.

DEMONSTRATION ON RESPIRATORY OBSTRUCTION.

A DEMONSTRATION was given at the Auckland Hospital by Dr. Hardie Neil. The tracheotomy tie was first shown. It was done by clove-hitching the wrists with a long bandage at the sides, and half-looping the ends of the bandage at the back of the knees, carrying one end over the knees and table twice, and bow-knot tying at the side of the table. It was claimed that it effectually restrained and was useful for certain work done under local or light general anaesthesia. The patient then was placed in a position suitable for tonsil-work. The shoulders were on a good full pillow, and the occiput on the table near the end. The surgeon in this position stands at the end of the table, and has the mouth of the patient in front of him, upside down. It affords an ample view for all interested, and gives easy access to the parts. Tonsils were enucleated with Sluder's guillotine, and the bleeding-points in the fossae shown and vessels gripped. The demonstrator thought that tying the carotids ought to be rarely required, except in secondary haemorrhage. La Force's adenotome was used, and the method of pressing firmly with a pad on the superior border of the constrictor behind Passavant's fold to stop adenoid haemorrhage at once.

A patient was next shown who had laryngeal obstruction following diphtheria. He had had a median to lower tracheotomy, but the larynx was never interfered with. By swinging laryngoscopy it was seen to be one of those cases described by Sargmont Jackson as hypertrophic. The aryteno-epiglottic folds and the ventricles were seen to be very redundant, so much so that an almost complete air-block occurred. It was proposed to remove the whole of the redundant tissue by cutting-forceps.

A case of very chronic aphonia was shown by Hill's direct speculum. The perfect approximation whilst coughing had not prevented the sentence of aneurism being passed. Professor Lindo Ferguson kindly saw her, to reassure the family.

A series of wet specimens were shown of various conditions associated with respiratory obstruction, attention being drawn to a specimen showing marked glandular hypertrophy of the mucous membrane of the septum posteriorly. The demonstrator remarked on the generally unsatisfactory results of local treatment in this class of case; but some of those present recommended the free rubbing-in of trichloracetic acid.

Another series of larynxes showed the results of trauma, infectious fevers, and granulomas upon the area over the posterior wall of the larynx below the cords. He stated that this subglottic area got its evil notoriety as the dangerous area of the larynx from the perichondritis of the cricoid due to the above-mentioned conditions.

A lantern demonstration was given of the development and anatomy of the tonsil. The demonstrator mentioned that his paper, showing the intra-tonsillar position of the fossa (that should be called the supertonsillar fossa—not supra-tonsillar fossa), was published twelve months prior to any succeeding paper on this subject.

INTRACRANIAL COMPLICATIONS OF ACUTE AND CHRONIC SUPPURATIVE OTITIS.

By S. A. Ewing, M.R.C.S. (Eng.), D.P.H. (Cantab.),

Hon. Surgeon for Diseases of Throat and Ear, Alfred Hospital, Melbourne.

In selecting this subject I was aware of the difficulty of dealing with it in any way worthy of its importance in the time available, and I have endeavoured as far as possible to compress within reasonable limits the main points which I wish to bring before you.

I do not think that any apology is necessary for the otologist transgressing beyond the limits of the temporal bone, and following up the extension of the infective processes of the ear. There are many advantages which his special training and knowledge give him in tracking out these complications, and in effectively carrying out the after-treatment; and I think that in the general hospitals, where in the past these cases were treated by the general surgeon, there is an increasing tendency for their reference to the otologist. There is now no doubt that the medical profession, if not the community, generally are seised of the dangers of suppurative otitis, but yet my own experience on the staff of a clinic attached to a general hospital unfortunately teaches me that too often the dangers have been overlooked until a condition that was easily remediable has passed into more than a forlorn hope.

It is over twenty years—October, 1893—since Sir William MacEwen wrote these words in his memorable work "The Pyogenic Diseases of the Brain and Spinal Cord": "Since the majority of pyogenic affections of the brain and spinal cord arise from neglected otitis media, they ought to be regarded as preventable diseases, and their prophylaxis scrupulously attended to." He further states "that the eradication of the otitis media must be regarded as the most potent factor in the prophylaxis of inflammatory cerebral lesions," and "where the tympanic cavity has become the seat of chronic suppuration, it becomes a standing menace to the safety of the patient. The disease progresses insidiously, and one cannot be certain as to where and when it may end. A person might as well have a charge of dynamite in the mastoid antrum and cells, as one cannot know the moment when accidental circumstances may arise which may cause the infective matter to become widely disseminated all over the cerebro-spinal system."

The truth of this declaration has been universally accepted, but, unfortunately, not acted upon.

To quote another great authority on diseases of the brain, and one to whom otology is much indebted, Ballance, in his latest work on "Diseases of the Brain," warns those responsible for the treatment of suppurative cavities adjoining the brain against temporizing with them, and strongly urges their surgical treatment.

That these two surgeons with their purely surgical outlook should adopt this attitude is not surprising, but I think their lack of special otological training has rather helped them into forming such definite opinions.

It is of interest to contrast an analogous surgical problem—namely, the treatment of appendicitis. The disastrous results of delay have gradually led surgeons to adopt the American Surgeon Deaver's dictum

—to operate at the first opportunity—and that is at the present time the rule that obtains. The occasional recovery after the supervention of peritonitis does not justify the onus of delay in the prompt removal of what is a danger to the whole organism.

We have to face the fact when we come to consider the treatment of chronic suppurative otitis that the attitude of the medical profession is not *pari passu* with the attitude towards appendicitis. How can we account for the wide prevalence of chronic suppurative otitis which we find existing in the community, and the tolerance of this state of things by the medical profession, if not by the otologists, where by operative if not remediable measures this disease can be cured?

I have no knowledge of the prevalence of this disease in New Zealand, but I know that in the clinics of Victoria we constantly see a large number of patients who have had suppurative otitis existing for many years while under medical treatment. These individuals are often a source of danger to others. I remember one case of a woman developing septicaemia after childbirth, in which there was grave reason for suspecting the cause to be from one of the household having foetid otorrhoea. I am of opinion that three main reasons are responsible for this tolerance—(1) Fear of further loss of hearing; (2) non-recognition of the dangers in uncomplicated chronic suppurative otitis; (3) absence of sufficient provision in our hospitals for the treatment of diseases of the ear.

(1.) The effect of the operation, undertaken to relieve the disease, upon the hearing requires some consideration. The first question put by the patient is frequently, "How will the operation affect my hearing?" In aural surgery we have to consider the value of the hearing-residuum to the individual, and whether this is likely to be impaired by any operation that may be performed. When the hearing in the other ear is good the difficulty in coming to a decision is lessened, but when both ears are involved, or the other ear deaf from a non-suppurative cause, a grave responsibility is thrown upon the aural surgeon. It is important to remember that, in testing the hearing previously to forming a decision, the ear should be put in the best position of advantage to carry on its function by appropriate treatment. As bearing upon this, I may mention that two years ago a patient consulted me in reference to his hearing. He had an important position in a large warehouse, married, with three young children. I found double suppurative otitis with abundant foul granulations in either ear. He was threatened with the loss of his position on account of his deafness. There was watch-hearing on contact in both ears, with marked negative Rinnie. After removal of the granulations the hearing was very little improved. I explained to the patient that an operation was advisable on both ears, and that the hearing would not be made worse. The patient replied that he was only concerned about his hearing. Unless this could be improved he was indifferent to any risk to his life, as that would not be worth the living should he lose his position. By supporting the fenestrae with cotton-wool tampons the hearing was very markedly improved up to watch-hearing 4/50 in both ears. I instructed him in the use of these, and did not urge any operation.

My personal experience in 104 cases of the radical mastoid operation performed at the Alfred Hospital during the last seven years has been that in none of these cases was the hearing seriously depreciated. In the great majority of these cases the hearing was already profoundly affected. In three cases where I have performed the double operation very fair voice-hearing has been retained. One of these was operated upon nine years ago.

(2.) *The Non-recognition of the Dangers in Uncomplicated Suppurative Otitis.*—In endeavouring to estimate the incidence of intracranial complications in chronic suppurative otitis we are confronted with many difficulties. When working in special hospitals one meets, I think, fewer cases of the graver complications than are met with by a surgeon attached to a general hospital. Though the diagnosis of suppurative otitis does not generally present much difficulty its presence is often overlooked, and its association with the graver maladies is not suspected; and patients are sent in as cases of pneumonia, septicaemia, and, where no post-mortem examination is made, may be signed up as such. The increasing difficulty in obtaining post-mortem examinations in hospitals, and thus determining the exact cause of death, adds to the difficulty. It may be of interest to review some available statistics.

At the Manhattan Eye and Ear Infirmary 12,744 cases of suppurative aural discharge were treated from 1895 to 1905, of which sixty cases were complicated by intracranial extension. Of these sixty cases, twenty-three were affected by a sinus thrombosis, thirty by meningitis, and seven by brain-abscess.

Jansen, of Berlin, found six cases of brain-abscess in 2,500 cases of chronic aural suppuration.

Pill, quoted by Barnhill and Wales, reports that of 9,000 autopsies in the London Hospitals, 1 in 158 were due to disease of the ear. In the Alfred Hospital, Melbourne, during 1907 to 1914, 445 cases of suppurative otitis were recorded, while during that period nineteen patients were admitted with intracranial complications, eight cases of cerebral abscess, two sigmoid sinus thrombosis, one cerebellar abscess, three cases of extradural and perisinus abscess, and five cases of meningitis. In several of the cases of cerebral abscess, sinus disease and meningitis also were present.

At St. Vincent's Hospital, to which I was attached in 1905–6, three cases of intracranial complications were admitted, two of meningitis, and one of cerebral abscess.

Of the nineteen cases admitted to the Alfred Hospital, thirteen of them were admitted when beyond operative treatment; two cerebral, one cerebellar, and the three cases of extradural and perisinus abscess were operated upon and recovered. I do not include in these cases necrosis of the wall of the antrum with exposure of the dura matter with granulations and some pus, which was not infrequently found in operations on simple uncomplicated chronic suppurative otitis, a condition termed "pachymeningitis externa" by MacEwen. This condition, the precursor as it is of the more serious lesions, though it yields usually readily to treatment without it, would constitute a grave danger.

(3.) *Insufficient Hospital Provision for Diseases of the Ear.*—I may instance the provision at the hospital to which I am attached. The clinic was founded in 1887, owing to the instance of the late Dr. Cox. The Surgeon for Diseases of the Throat and Ear has the privilege of a bed in the male, female, and children's surgical wards—three altogether; though this was sufficient provision for many years, the many advances in operative ear, nose, and throat work made it very difficult to carry on the clinic at the present day.

A blot on the history of the Melbourne Hospital, the chief general hospital of Victoria, is the fact that there has been no special department there until very recently, and as yet I believe no beds are available.

These are, in my opinion, the chief reasons for the large amount of uncured suppurative otitis existing; and this condition, the dangers of which Sir William MacEwen pointed out so many years ago, is one which I think it is our duty to remedy.

It should be remembered that these patients are also, in carrying about infectious germs, often in a high state of virulence, not without danger to the community.

I cannot but think that there is also "the want of a lead" from the otologists. In a recent newspaper discussion on the selection of works of art for the Melbourne Public Gallery an artist aptly pointed out that the taste of the public for works of art depended not upon the general public, not upon the amateur, but on the opinions and judgment of the general body of artists themselves, which in the course of time always became the accepted standard.

I have instanced the altered attitude of the public towards appendicitis. How far this has been due to the work of Sir Frederick Treves, and the many skilled surgeons who followed the track that he blazed, it is difficult to say; but possibly the ready acceptance of their lead by the community was not uninfluenced by the successful issue of the operative treatment of a King.

DISCUSSION.

Dr. ROBERTSON (Brisbane) said,—I have been fortunate in seeing only one case of meningitis secondary to middle-ear trouble. A boy had a polypus removed from left ear. The discharge dried up so completely that the Resident suggested sending the patient home. I kept the patient a few days longer for safety's sake, when meningitis began. A complete mastoid was done at once. No pus could be found in the middle fossa, or in the neighbourhood of the sinus. Death occurred in three days. P.M.: General meningitis with pus found everywhere under the pia, except at site of operation. I believe preventive measures are most important, and consider early removal of adenoids, tonsils, &c., with the early diagnosis and treatment of middle-ear troubles, vital. I have found vaccines of great service in acute conditions. Have seen a number of children showing symptoms of meningical irritation completely relieved by the mastoid operation.

ACUTE OTITIS MEDIA WITH SINUS THROMBOSIS AND SECONDARY INFECTIONS.

By G. H. Hogg, M.D., Launceston, Tasmania.

Male, aged fourteen years, was seen by me on the 6th January, 1913, with a history of a sore throat which came on a week previously after sea-bathing. This was followed by severe earache and discharge from the left ear. On examination the pulse was normal; temperature, 99°. There was a large perforation in the anterior part of drum-membrane, through which a copious watery discharge escaped.

8th January; T. 104°; pulse, 148; ear as before; no mastoid nor jugular tenderness.

The mastoid process was freely opened on the 10th January, only two or three drops of pus being found in the small cells at apex of mastoid. The autrum was deeply situated, very small, and contained no pus; the temperature fell, and remained normal for twenty-four hours. Facial palsy was noted some hours after the operation. In two days the boy became worse, complained of headache, was very restless in bed, and at times delirious; vomited once or twice. Temperature and pulse as charted; no rigors nor sweating. The original mastoid opening was enlarged backwards and upwards, and a considerable extent of the lateral sinus exposed. This was found to be thrombosed, and a subdural abscess was opened slightly in front of it. The walls of the sinus above seemed almost gangrenous, and were removed as completely as possible, and the sinus followed up until free bleeding occurred. Below, as the walls seemed healthier and the sinus sealed by tough clean-looking clot, I determined not to removed the clot at present.

Next day patient developed an irritating cough, and complained of pain in hip and knee of the right side, so that he cried out if moved in bed.

On the 24th January the internal jugular and common facial veins were exposed, and, although found quite healthy, about an inch was removed from each between ligatures. Anti-streptococcic serum and later an autogenous vaccine of *Streptococcus* and *Staphylococcus* was administered.

The cough disappeared in a few days. The hip and knee remained very painful and tender for some weeks, the knee recovering first. For many weeks pain was felt on attempting to move the hip, and two months elapsed before patient could walk; even then the hip was stiff and fixed, and there was a compensatory curvature of the spine. Facial palsy had completely disappeared some weeks before.

Points of interest in the case are—(1.) The rapid development of intracranial lesions, notwithstanding the large hole in the drum and free escape of discharge; in this relation it should be borne in mind that such complications are more liable to occur in acute otitis media than are sometimes thought to be the case. (2.) The subsidence of the symptoms of secondary infection, without suppuration at the foci of infection. (3.) The beneficial effect of the autogenous vaccine. (4.) Ligature of the jugular vein: it may be said that this should have been done earlier. Ligature of the jugular vein in thrombosis of the lateral sinus is a debatable question, and arguments have been adduced both *pro* and *con* too length to enumerate here. Zaufal, Von Bergmann, and others advocate, as a rule, ligature of the jugular before opening the sinus, but only if a septic thrombosis is found after the sinus is exposed. Jansen thinks ligature is indicated only if rigors and fever continued after opening the sinus; while MacEwen only ligatures the jugular if the thrombosis extends so far down that it can no longer be reached from the sinus; Horsley only when metastases are present. I am inclined to think that the safer practice is to ligate and resect the jugular when on exposing the sinus it is found thrombosed; and where the thrombosis extends down into the bulb it is better to carry out the method of Alexander, of Vienna—of splitting the upper end of the vein and sewing it into the wound of neck, so that it may act, if need be, as a drainage-tube. From this I have seen excellent results.

THE PREVENTION OF ACQUIRED DEAFNESS.

By Macleod Yearsley, F.R.C.S. (London),

Senior Surgeon to the Royal Ear Hospital; Otologist to the London County Council; Chairman of the Medical Committee of the National Bureau for promoting the General Welfare of the Deaf, &c.

[*Read by Dr. S. A. Ewing.*]

Gentlemen,—I am deeply sensible of the honour done me by your request to contribute a paper at the Australasian Medical Congress, and offer you my apologies for my inability to read it to you in person, apologies which, I can honestly assure you, are mingled with sincere and lively regret.

I have chosen a subject which is beginning to occupy the serious attention of otologists in the Mother-country, and which, in her younger and more vigorous offspring of Australasia, will no doubt receive a hearty and practical support. The medical profession has hitherto taken the great affliction of deafness too much for granted as a necessary evil; to speak colloquially, it has taken deafness too much lying down. At least 50 per cent. of the cases of chronic deafness which are to be met with in every large city are preventable; indeed, this estimate errs upon the side of inadequacy. Possibly in the older civilizations of the European countries the problem which has to be faced is a greater one than you will find it here, but if once it be realized you will have a better chance of solving it successfully. As far as I can judge by inquiry, Great Britain has the honour of once again leading the world by initiating this movement of prevention, as she has led other important movements pregnant for the good of humanity and the relief of suffering.

At a meeting of specialists there is no need for me to dwell upon the disabilities—social, civil, and physical—under which the deaf suffer, but I shall content myself with endeavouring to point out the best methods by which these disabilities may be prevented. Upon the question of congenital deafness I shall say nothing; if I did, this paper would grow too large, and there is no doubt that at the present time it is the problem of acquired deafness that is the more practical.

If we are to prevent deafness we must begin, in the large majority of cases, with the child. Most of the chronic deafness in the young adult owes its origin to conditions acting in early life, and it is therefore to these earlier years that we must turn our attention.

The great majority of cases of acquired deafness can be classified in three groups—meningitis, the infective diseases, the primary ear-disease. From my own figures, published in a paper which I read before the Health Congress in London in June, 1912, dealing with 723 cases, I give you the percentages relating to each of these groups of causes: Meningitis 169, or 23·5 per cent.; the infective diseases, 343, or 47·4 per cent.; primary ear-disease, 211, or 29·1 per cent.: total, 723.

I propose to deal first with meningitis. This is one of the most common and serious causes of deafness in Europe, and no doubt it is an equally efficient factor in Australasia. Statistics given by different observers have varied from 12 to over 50 per cent. It is a condition which may arise from a variety of causes—epidemic cerebro-spinal meningitis, congenital syphilis, tubercle, scarlet fever, measles, &c. In the figures just given the numbers are probably too low, and no doubt a fair number of those placed under the heading of the infective diseases were instances of meningitis. Now, the causes of meningitis require more careful study than has been accorded to them hitherto. In England, only the epidemic cerebro-spinal and tuberculous forms have been made notifiable, and the reasons for notifying them were based upon their infectivity. It is no exaggeration to say that our present knowledge of meningitis is at about the same stage as that of typhus and typhoid was some seventy years ago, save that we have the advantage of being conversant with micro-organisms as a cause of disease. Many of the forms not at present notifiable are undoubtedly infectious. Here, then, is a fine and fruitful field for investigation and research, and I recommend it to those of my audience who are looking for some subject upon which to exercise their superfluous energies. In order that we may know more of the etiology of the various forms of meningitis—a disease which kills or maims thousands of children every year—research must be organized, and, that this may be done, it is necessary that all forms should be notifiable for the purposes of isolation, treatment, and research.

Among the infective diseases, we have specially to consider the exanthematous fevers and syphilis. A great group of cases of acquired deafness owes its existence to the former, and of these the majority is due to scarlet fever, diphtheria, and measles. Notification and isolation has done much already to reduce the numbers of cases of the exanthemata; but ear-disease, when it occurs during its course, requires to be dealt with more promptly and more efficiently. The ear-complications of the infectious fevers may be roughly divided into two groups—those due to meningitis and those due to suppurative middle-ear disease. Of the former there is no need to speak further here; the latter are most serious and most dangerous to life and hearing. Scarlatinal and diphtheritic otites tend to kill, though fatal results may be delayed for years. They tax the skill of the otologist to the utmost, but they can be prevented by timely treatment. Such treatment can only be carried out adequately by a specialist, hence it is highly important that an otologist should be on the staff of every fever hospital. This recommendation is by no means a new one; it was urged as long ago as 1904 by Dr. Knyvett Gordon, himself a medical officer at a fever hospital; and at the annual meeting of the British Medical Association at Liverpool in 1912 the same suggestion was unanimously agreed upon by the Otological Section. In 1913 the London Branch of the Association of Medical Officers of Health, in response to my urgent request in a paper read before them, sent a unanimous resolution to the same effect to the Metropolitan Asylums Board in London, and a month later a similar resolution was passed at the seventeenth International Medical Congress.

Syphilis is, to the credit of modern medical and social progress, at last being dragged out from behind the veil of hypocrisy and cant that has been too long its hiding-place. We are beginning to discuss it openly, as it should be discussed. At last a Royal Commission has been formed in England, and that Commission, if it is to do its work fearlessly and steadfastly, should bring about great changes. Syphilis is another disease responsible for much suffering and deafness. One requires to have had some experience of deaf-school work to realize the terrible nature and the frequency of deafness due to this condition. It has been said that it is doubtful if any disease, even tuberculosis, is so destructive of child life or so disastrous to child health. Thanks to the recent splendid research of my friend Dr. Kerr Love, of Glasgow, the part played by congenital syphilis as a cause of sporadic deaf-birth has been made patent beyond doubt, and is a convincing reply to the dogmatic statement of a well-known otologist that it is never a cause of congenital deafness. We are not, however, discussing congenital deafness here, and syphilis can give us quite enough to think about as a factor in the causation of acquired deafness. It gives rise to a large number of cases of deafness during and after school life in Great Britain. I do not know how it is with you, for I know of no statistics to enlighten me. Yet this unhappy condition of things is eminently preventable. Years ago it was pointed out that when deafness and blindness arise as a result of congenital syphilis it is in those cases where there was no treatment during infancy. Most cases occur among the poor, because in that class the disease so often goes unrecognized and untreated. Were it made notifiable both mother and child could be reached, and treatment facilitated. The feeling that, by some such means as notification, it is imperative that we should gain some control of the disease, is growing in England, and public opinion is becoming aroused to this fact. At the meeting of the Association of Medical Officers of Health already alluded to, besides the resolution mentioned earlier in respect to fever hospitals, the following opinion was sent, by a unanimous vote, to the English Local Government Board: "That this branch is of opinion that it would be in the interest of the public health, and assist in the protection of infant and child life, if the Local Government Board issued regulations requiring the notification of cases of syphilis, congenital and acquired; and that, following the method so successfully adopted in the case of tuberculosis, the Board should make provision in the first instance for such notification to the Medical Officer of Health of sanitary authorities of the inmates of poor-law institutions, and of persons under the care of district medical officers." May I recommend this resolution to your consideration, in the hope that you may see fit to support it in Australasia as I hope to see it supported in the Mother-country?

The last group of causes is that of primary ear-disease. Here again it is the child that must be primarliy dealt with. This largely resolves itself into the efficient treatment of adenoids, and, may I add, their efficient after-treatment. Moreover, there is to be considered also the prevention of adenoids. This means better housing, better feeding, better hygiene generally of infant life, especially among the poor. Putting aside the question of the exanthemata as factors in the etiology of adenoids, I believe overcrowding in poor homes to be a fruitful cause. Whether that is so in your large cities, I do not know. Barraud, of Lausanne, has indicated that improper artificial feeding is another; if so, it gives another reason for every mother to become a complete mother, and undertake her full responsibilities.

Another point to be remembered in the prevention of deafness in the child is the efficient and conservative treatment of middle-ear suppuration, and, when in such cases an operation is necessary, that more attention should be paid to the conservation of the hearing.

In London we have now centres for the treatment of school-children. I have urged most strongly that in ear cases these centres should be in charge of an otologist. I think I shall have the support of all of those present when I say that the treatment of ear-disease in children can only be carried out efficiently, and therefore economically, by those who have the special knowledge that comes of experience as a specialist.

I have already said that the secret of preventing deafness in the adult is largely that of prevention in infancy and childhood. We must, however, consider for the moment the question of deafness arising in adult life from non-suppurative middle-ear disease. Practitioners, even otologists, have not yet fully recognized how much can be done in the way of prophylaxis by attention to the upper air-passages. By this I do not mean a half-hearted temporizing with sprays, nasal washes, cauteries, and the like, but by judicious and carefully thought-out operations. Later on in life we are faced with another problem—that of senile deafness—and I have one suggestion to make concerning it. I am inclined to the opinion that a large number of these cases owe their origin to chronic auto-intoxication, due, in the majority of instances, to intestinal stasis.

In conclusion, I must apologize for introducing so much that is merely indicative of means for the prevention of deafness. Had I entered into detail I should have made my paper too far long, and to an audience of otologists such detail would have been only a wearisome reiteration of what is already known to you. In many of the suggestions made I have been voicing the opinions of the Medical Committee (of which I have the honour to be Chairman) of the National Bureau for promoting the General Welfare of the Deaf, a committee entrusted by its parent council with the movement for the prevention of deafness which the bureau has initiated.

Gentlemen, I have only to thank you again for allowing me the privilege of contributing this paper *in absentiâ*, and to offer my excuses if, in my ignorance of conditions in Australasia, I have discussed matters which may be superfluous from your point of view. I trust that you will accord my paper a generous, fearless, and full discussion, and that I may later read your criticisms in your Transactions, with profit to myself.

DISCUSSION.

Dr. Ewing (Melbourne) voiced the opinion of all members, as evidenced by an outburst of applause, when he said that the paper was a statesmanlike exposition of the subject of the prevention of deafness. There could be no possible difference of opinion as to the urgent necessity for State action on the lines indicated in the report.

Dr. HARDIE NEIL advocated the examination of the children in the Deaf-mute Home at Christchurch; and it was resolved, on the motion of the President (Dr. R. H. PULLEINE), and seconded by Dr. ROBERTSON, of Brisbane, That the New Zealand Government be asked by Congress to investigate by the Wassermann test the cases of deafness in the Deaf-mute Institution, and that the Congress again affirm its approval of State action in the direction indicated in the paper of Mr. Macleod Yearsley.

SUBMUCOUS RESECTION OF THE SEPTUM.

By Dr. ROBERTSON, Brisbane.

THAT submucous resection of the septum has solved the difficulties in treating obstruction in a great many cases will be readily granted, but it will also be agreed that every case of deformity of the septum does not call for resection.

Many shelves and spurs may be resected without formally removing the greater part of the septum, but I am satisfied that it is the preferable operation in young people if the shelf is of any size. If you remove a fair-sized shelf in a child or youth, my experience is that through the weakening of the septal framework further deviation and deformity of the septum will occur as the nose develops.

The indication for this operation, to my mind, is that the deformity of the septum is such that sufficiently free nasal respiration cannot be obtained without sacrificing healthy mucous membrane elsewhere in the nose.

The main conditions for which I have done this operation, I find by my notes, may be classed thus: For nasal obstruction and its attendant discomforts, 62 per cent.; for obstruction with ear-disease, 17 per cent.; in cases of asthma and hay-fever, 14 per cent.; for headache, presumably due to pressure, 5 per cent.; in polypus cases, where one side may be inaccessible or where drainage is faulty, 2 per cent.

I resected one case of epilepsy where there was great thickening of the upper and posterior part of the septum with pressure. The result was distinctly favourable, the attacks being greatly reduced in frequency and violence. A similar case of thickening and pressure, where there was great mental confusion and giddiness, did splendidly well.

Of course, the amelioration and cure of troubles in the naso-pharynx, pharynx, and larynx were also aimed at.

Contra-indications.

Careful inquiry must be made for any history of syphilis. I saw one case operated on by another surgeon where a disastrous result ensued from neglect of this precaution.

The worst result I have ever obtained was in a diabetic case where I am ashamed to say I neglected to examine the urine, and the flaps sloughed, leaving a large perforation.

Tender age and old age should also be left alone.

In childhood I am chary of interfering with the septum, but when the obstruction is obviously retarding the proper development of the child I think it is our duty to operate. I have done a large number of urgent cases at our Children's Hospital with very satisfactory results so far, but I should much like to see the results ten years hence.

Methods.

I invariably use a local anaesthetic, except in children under the age of ten or eleven. Normal saline containing 10 per cent. cocaine hydrochloride, 1–4,000 adrenalin, and 0·5 per cent. carbolic acid makes an excellent solution, and if the septum is papered with thin sheets of long-fibred cotton-wool moistened with this no pain whatever will be felt. So satisfied am I with this anaesthesia that I refuse to operate on any case under a general anaesthetic. Twenty minutes to half an hour is sufficient time to secure complete anaesthesia. Much time is saved, as there is no waiting for the anaesthetist, and there is no vomiting, and less bleeding. The time occupied by the operation varies from ten minutes to half an hour, depending on the difficulties. I have the patient recumbent, and am myself seated. This is less trying to both. I begin with a vertical incision on the convex side from $\frac{1}{16}$ in. to $\frac{1}{8}$ in. from the skin-margin, elevate the perichondrium and periosteum on that side at once unless there are sharp spurs, cut through the cartilage by sense of touch, and then elevate the other side.

After removing the cartilage with Ballinger's knife or punch forceps, as may be called for, I separate the periosteum more thoroughly and remove the entire obstruction. I leave as much cartilage as possible under the ridge of the nose. I have seen one case done by another surgeon where the bridge collapsed. The maxillary crest is best treated by the gouge and mallet, or Wood's or Hurd's forceps. I do not wash out the cavity, but mop out with moist sterile mops in forceps.

I usually insert one stitch to prevent dragging of the flap on the side of the incision, and pack, not too firmly, with Burroughs, Wellcome, and Co's. bismuth gauze strips. I pack the incision side first. If the deformity is S-shaped, or there is much thickening in front, it may be necessary to incise both sides at different levels, after the method of Watson Williams.

The first night will be a miserable one, with face-ache of a neuralgic character and little sleep in adults. Aspirin gives much relief, or morphine $\frac{1}{6}$ gr. may be required. The packing is removed next day. Thereafter an alkaline nasal douche is useful. In very catarrhal cases I find an atomizer with acetozone inhalant of great use.

I have tried German bismuth bandage in strips for packing, but it seems to irritate and cause the production of a gelatinous fibrinous deposit by the second day, so have abandoned it, although it is easier of removal.

Lake's rubber splints do well, but I think they tend to produce more bleeding into the flaps. Compressed cotton splints I have not tried. Gauze moistened with liquid vaseline I used for years, but now prefer the bismuth gauze.

Complications.

I have had suppuration once, because I left a mop between the flaps.

Haemorrhage between the flaps occurs from time to time, and is disconcerting. So long as the quantity is not great, it is unnecessary to interfere. It is wonderful how completely the blood is absorbed, and no evidence of its presence remains. I have opened the incision and cleared out the clot, after cocaining the nose several times, but the process is distressing to the patient, and may entail repacking or the use of splints, and I think the result is not so good as when let alone. I have found considerable oedema of the posterior end of the septum, and posterior ends of the turbinals twice. This yielded readily to the cautery.

In cases from which polypi have been removed, I have found them recur after the disturbance caused by the resection, but after removing them again the improved drainage seemed to prevent further trouble.

I have had about a dozen perforations altogether in over five hundred cases. The worst was in the diabetic case, which gave some trouble with crusting for a time. Alkaline lotion freely used and acetozone inhalant eventually overcame this; and the patient, whom I saw recently, is very comfortable, much more so than before the operation, when he was almost completely blocked. One case with a patched cleft palate gave trouble with crusts for some weeks, but eventually cleared up.

Results are generally excellent, and it is surprising to find that a few weeks after operation there is absolutely nothing to show that the septum has been removed. It may be necessary to cauterize the turbinal on the hollow side to equalize the airways. I think one may say the results are uniformly good.

Several cases of asthma with marked deformity of the septum have got perfectly well after operation, without further treatment; some get temporary relief. In some cases resection was necessary to make the "asthma" region accessible to the cautery.

Ear cases benefited by the improved nasal respiration and drainage.

Altogether one may say that this is one of the prettiest, best-thought-out, and most satisfactory operations undertaken in the nose. Its conception has been a boon to rhinology.

DISCUSSION.

Dr. **Hardie Neil** (Auckland) drew attention to a diagram published in the *British Medical Journal* some years old, which included the anterior nasal spine in the parts to be removed. He said that the removal of this would, in traumatic cases, make the danger of nose-drop much more serious. It could never be necessary except in osteomatous conditions. He advised the use of an elevator with a shallow crook (Greville McDonald's) for getting off the mucous membrane of the concave side by a forward pull. As regards the unpleasant after-effects of the operation, he advocated the use of a powder consisting of veronal phenacetin and Dover powder—5 gr. (or less) of each. Three were given every four hours during the first day whilst the patient was awake and uncomfortable, and one on the evening of the second day. They made the patient quite easy, and ensured a comfortable sleep on the first night. He strongly advised it as a sedative following minor operations, and said that hospital experience of it during the last few years had only increased his opinion of its value.

Dr. ROBERTSON (Brisbane) said (in reply),—I have noticed particularly the occurrence of septal deformities in families. Prefer to delay resection in children until about sixteen years of age. I have operated on a number of cases from ten years upwards under cocaine without trouble, and I find general anaesthesia most troublesome. For the removal of large crests far back occurring in resection cases, I find Grunwald s punch most useful for seizing and breaking off the spur. I have had no ear-troubles following resection. *Re* packing, I do not consider that any form of splint in use can cover the whole denuded area sufficiently, so continue to use gauze packing. Shall consider Dr. Ewing s method of removing the packing in four hours.

NASAL OBSTRUCTION.

By F. W. MACKENZIE, M.B., C.M. (Ed.).

IN order to correctly determine the factors which lead up to obstruction in the cavities of the nose one must have an intimate knowledge of the anatomy of the parts concerned, and of the physiological functions which these parts perform in the normal state. I shall therefore remind you very shortly of those parts and functions which will come into the discussion, in order that you may realize the point of view from which I look at the subject.

Anatomy.

You will remember that the nose is divided into two cavities by the septum—the right and left nasal fossae. They are situated in the middle of the bones of the face, and extend from the anterior nares to the upper part of the pharynx. In the nasal fossae there are a series of openings from accessory cavities situated in their walls—the frontal, ethmoidal, sphenoidal, and maxillary sinuses. Comparative anatomy and embryology, in showing that these cavities are diverticula from the nasal fossae, explains or illustrates that the pathology of these regions can be foreseen by knowing that their structure from the anatomical, pathological, and clinical aspects is similar, and that the different parts cannot be studied separately from each other. One might compare them with the relation of the mastoid cells to the middle ear.

Looked at in a frontal section, each nasal fossa is in the form of a triangular prism, of which the base is inferior and the apex superior. The nasal septum forms the internal wall. The external wall holds the maxillary and ethmoidal sinuses; and the openings of these, together with that of the frontal sinus, appear upon it. The inferior wall separates the fossa from the mouth. The superior wall is very narrow, being merely the edge of the triangular prism to which the cavity has been likened. It forms the roof of the fossa, and separates it by very thin bone from the intracranial cavity.

On examining a frontal section carefully one notices, on the outer wall of the nasal fossa, two or more irregularly curled bodies with depressions between them. These are the turbinated bodies, with the inferior, middle, and superior meatus below each corresponding body. The same section will show that the bony framework of the nasal fossa is, in great part, formed by two bones—the superior maxilla and the ethmoid. The superior maxilla and the palatine bones behind form the floor and the lower part of the external wall. The ethmoid forms the upper part of the external wall by the inner surface of its lateral masses, and the nasal roof by its cribriform plate. The roof is completed by the nasal bones in front, and by the body of the sphenoid behind. The vertical plate of the ethmoid forms the upper part of the septum.

Anteriorly the nasal spine blends normally with the anterior border of the vomer. Its anterior surface is smooth, or is sometimes grooved, prolonging the groove on the vomer, and often it is slightly curved and in the same direction as the anterior surface of the vomer. It is therefore slightly oblique below and in front, and receives the anterior extremity of the vomerine border of the quadrangular cartilage. It projects normally 6 or 7 mm., but it sometimes hypertrophies and presses back the inferior border of the cartilage, leading to a deviation of the septum at this part. Occasionally the spine is double, one side being longer than the other; this also causes deviation of the vomerine border of the septum. Bony spurs are not infrequently found immediately behind the nasal spine.

Turbinated Bodies.

As hypertrophy, or vascular swelling of the soft parts covering these bodies, is a very frequent cause of nasal obstruction, they require due consideration in order to treat the conditions rationally. The inferior turbinate is an independent bone, thin, and of a triangular form, with its base anterior and its summit posterior. It is attached by its superior border to the superior maxilla. At about 1 cm. from its anterior end it sends upwards a small osseous lamella, which assists in the formation of the osseous lachrymo-nasal canal. This is the lachrymal process of the turbinate. It is necessary to preserve this carefully in operations on the turbinate bone, as otherwise obstruction of the lachrymal canal and epiphora, with its consequences, will ensue.

The border of the turbinate which forms the base of the triangle is inserted into the vertical part of the superior maxilla. The inferior border is generally as thick and spongy as the rest of the bone, but is sometimes transformed into hard compact tissue.

The body tissue is irregularly crossed by little cavities and true canals which convey the blood-vessels.

The middle turbinate is a curled triangular mass of spongy bone formed in the lateral mass of the ethmoid, descending into the nasal cavity, and forming, with the external nasal wall, a cavity called the middle meatus. Like the inferior turbinate, it is triangular, with its base downwards and its apex behind. Its superior border is attached to the ethmoid, the palatine, and the vertical part of the superior maxilla. Near the anterior end of the free border there is often a tubercle, which, when large, is apt to be mistaken for a new growth.

Like the inferior turbinate the bone is a network, but being a prolongation of the ethmoid it contains similar but smaller air-cells. Not infrequently one of these cells near the anterior part becomes very much enlarged, and forms a cyst containing air, yellow fluid, or, in suppurative conditions, pus.

A. Zwillinger, of Budapest, has described a condition in which the whole middle turbinated bone is converted into an osseous air-containing bulla, hemispherical in shape, and obstructing the nostril.

Charles L. Knight, of New York, considers that these bullous enlargements are much more common than is generally supposed, and any one who has had much experience of nasal surgery must have met with a considerable number.

Since Dr. McBride reported the first case in 1888 many others have been observed, and a few years ago Dr. Logan Turner, of Edinburgh, published a valuable paper on the subject in the *Edinburgh Medical Journal.* Not infrequently the bulla ethmoidalis becomes much enlarged, and obstructs the nostril. It usually contains air or a yellowish clear fluid. Sometimes it contains pus.

Enlarged suppurating ethmoid cells sometimes obstruct the nostril. They are frequently associated with nasal polypus, and are a part in a general suppurative process in the section of the ethmoid involved.

A frequent cause of nasal obstruction is deviation of the nasal septum. I believe the condition is rarely traumatic, but one occasionally meets with a case in which the nasal septum appears to have been forcibly pressed downwards and broken, leaving a long crest on one side and a depression with rounded edges on the other.

Abnormal development of the nasal spine as a cause of deviation of the cartilaginous septum has already been mentioned. The most frequent cause, however, is a faulty formation of the roof of the mouth, leaving too little room in the nose for the septum to remain straight. The high arched palate necessitates the floor of the nose being on a higher level, so that the normal growth of the septum necessitates its being curved. As this condition is very frequently associated with hypertrophy of the lymphoid tissue in the retro-nasal fossa, together with the accompanying erection of turbinated bodies, the surgeon has to discriminate carefully which is the real cause of the obstruction before deciding on an operation to relieve it.

Congenital occlusion of the nares is occasionally met with; it is usually a bony septum across the posterior nares, but a few cases of membranous obstruction have been reported.

Very rarely tumours obstruct the nasal passages. Ivory extosis may encroach from the neighbouring sinuses, fibroid growths obstruct the posterior nares, and malignant growths have been sometimes observed.

A very common cause of nasal obstruction is enlargement of the retro-nasal lymphoid tissue.

There is no symptom of so much importance, in the consideration of the influence of affections of the nose on the general health of the individual, as nasal obstruction. The question as to whether a child will grow up strong and healthy is largely determined by the question as to whether it can breathe freely through its nose or not. Further, a large number of the diseases of adult life are dependent primarily upon some affection of the nose which leads to more or less obstruction.

J. L. Goodale studied the action of the nasal mucous membrane on inspired air, the normal conditions in intra-nasal air-pressure, and the route taken by inspired air within the nose. He found that the relative humidity of the air, after passing through the nose in the normal way, is near saturation-point with reference to its own temperature; also, that the temperature of the air when it reaches the post-nasal fossa is nearly as high as that issuing from the lungs, and that the nasal fossa is a very efficient filter for dust.

J. Herzfeld published some years ago, in the "Archives of Microscopic Anatomy," an exceedingly important article concerning the erectile tissue of the turbinals. To those who are in the habit of destroying this tissue with the cautery it is an interesting study, as showing the amount of damage that can be done to the functions it performs. Zukerkandl had previously called attention to the presence of a special muscle of great importance in the expansion and contraction of the erectile tissue. Herzfeld's observations have fully verified those of Zukerkandl, and he further pointed out that the numerous openings that may be seen with the naked eye upon the surface of the turbinated bodies are the orifices of canals, which, taking a course parallel to the length of the bone, terminate with intercommunicating spaces of irregular form in the bone proper. These spaces are found to contain fat cellular tissue and blood-vessels, and from them efferent vessels penetrate the erectile tissue.

Kayser has shown by a series of carefully conducted experiments that the course of air through the nose is above the inferior turbinal, and that the air describes a semicircular course, passing upwards nearly to the roof of the nose.

From these ascertained facts it will be readily seen that, apart from the immediate danger of intracranial suppuration, the heroic application of the cautery to the turbinals must seriously affect their function of moistening, warming, and filtering the inspired air. From them also the folly of complete excision of the turbinals for simple nasal obstruction is manifest, for to make a straight passage through the nose establishes nasal breathing without any of its advantages, whereas in mouth-breathing the tongue and cheeks do warm and moisten the air to an appreciable extent.

For many years past the condition in which the post-nasal lymphoid tissue swells up and leads to more or less nasal obstruction has been recognized as being associated with disease in the middle ear. As long ago as 1888 Adolph Bronner pointed out in England that 85 per cent. of those children who had adenoids had also some affection of the middle ear. In the following year E. Weil expressed the opinion that adenoids were the cause of a large proportion of children's diseases. At this time it was generally held that the ear-disease was directly due to the nasal obstruction, but of late years the opinion has been growing that it is the presence of the adenoids, and not the actual obstruction, that usually leads to deafness. I believe that adenoids always cause some ear-trouble sooner or later, mostly later when the lymphoid tissue has become more fibrous and has ceased to cause any serious nasal obstruction.

Associated with hypertrophy of the retro-nasal lymphoid tissue it is common to find swelling of the turbinals, and later on hypertrophic conditions in them. This is by far the most common cause of nasal obstruction, and has led to more destruction of the useful tissues of the nose in the attempts to remedy it than all the other nasal diseases.

Following up the literature of nasal obstruction and the diseases associated with it in its various phases, one is impressed by the large number of remote affections which have been cured or relieved by restoring normal nasal respiration.

Affections of the nervous system occur, such as headaches, squint, stammering, spasmodic movements of the eyelids and facial muscles, epilepsy when associated with a nervous system tending to it, spasmodic croup, asthma, hay-fever, aphonia, nocturnal enuresis, eye-strain, various derangements of sleep, temper, spirits, energy, intellectual power, and other brain-functions. Other disturbances as anaemia, digestive and respiratory disturbances, epiphora, decayed teeth, consumption, nasal catarrh, laryngitis, &c., are also quite frequently met with as results of nasal obstruction. When one considers how absolutely important a proper supply of warmed, filtered, and moistened air is to the organism generally one can understand how, in different temperaments, so many varied conditions arise when it is withheld.

The subject of nasal obstruction is specially important in regard to growing children—more important probably than all the other morbid conditions from which children suffer, and probably the cause of many of them.

In considering treatment, one must bear in mind that there is more danger in doing too much than in doing too little, or even nothing at all. If the nose is converted into two straight tubes by removing both inferior turbinals so that the inspired air passes along the floor of the nose a worse state is produced than when the patient breathed through his mouth, for the tongue, cheeks, and tonsils do a good deal towards moistening and warming the air, whereas the inferior nasal cavities without the turbinals do practically nothing. I am aware that such distinguished men as Carmalt Jones (of spokeshave fame), Hintz, Abercrombie, Scannes Spicer, Lennox Browne, and many others have spoken and written enthusiastically about the benefits of complete turbinotomy, but I am satisfied that if they have followed up their cases and studied the late results of the operation those of them who are still in practice will have abandoned the operation as a routine practice long ago.

I wish also to condemn the too prevalent practice of reducing turbinal hypertrophy by extensive cauterization. The result of this treatment, causing as it does extensive scars and sometimes adhesions, frequently leaves the patient in a worse state than he was before.

In the treatment of enlargement of the post-nasal lymphoid tissue it is important to distinguish between hypertrophy and inflammation leading to temporary swelling. Inflammation may produce many of the symptoms of adenoids—snoring, mouth-breathing, nightmare, &c. —and, in addition, painful swelling of the glands at the angle of the jaw, together with rise of temperature. It is the inflammatory condition which is amenable to medical treatment and breathing-exercises, and which has led some observers to the conclusion that these measures can cure adenoids. Really where definite hypertrophy of the lymphoid tissue has occurred nothing but operation will cure it.

Many authorities have maintained that adenoids will grow again after removal. I am satisfied that after proper removal there is no recurrence. In very young children, where the post-nasal cavity is small and there is difficulty in introducing both the finger and an instrument, imperfect removal may result; and the subsequent swelling of the tissue remaining may lead to the impression that there has been a recurrence, but with increasing experience one finds that an apparent recurrence under any conditions is exceedingly rare.

I wish to lay stress on the association of adenoids with eye-strain, for I consider it most important in relation to the development of the coming race. The increase of ignorant spectacle-sellers in New Zealand, and the foolish simplicity of the people in believing in them, threatens the future well-being of many children. A child with adenoids and one or two dioptres of hypermetropia is very likely to suffer from eye-strain under the stress of our educational system. Most children have some latent hypermetropia, and no one knows anything about it if the child is otherwise in robust health. The sight becomes normal as the child grows up, and it does not suffer from eye-strain. Those children with adenoids frequently do suffer. That is why the spectacle-seller is consulted. The children get some relief from the glasses. So do children get some relief from spinal supports when they have lateral curvature of the spine. But in neither case is a cure effected by the mechanical aid—rather is the trouble perpetuated, because a natural cure is prevented by the very means adopted to relieve the trouble. In the case of adenoids and hypermetropia the spectacles relieve the strain, and allow the child to go on with its studies. The spectacles also prevent the normal demand for a return of the sight to normal, and many of these have to wear spectacles throughout their lives, whereas a carefully performed operation would have cured the overstrained eyes and allowed the eyes to develop to normal in the way intended by nature.

A METHOD OF ACCURATELY TESTING THE HEARING OF CHILDREN.

By Silye C. Bevan, M.B.B.S. (Melb.), L.R.C.P. and S., (Ed.),

Medical Officer of the Department of Public Instruction, New South Wales.

The importance of accurately determining whether a child is deaf or not will not for a moment be questioned. It appeals even to the lay mind, and to the medical mind it needs no forcing-home of the truth that the earlier even the slightest degree of deafness is detected the more chance is there for the sufferer to find relief by appropriate treatment.

The insidiousness of the onset of deafness is well known to all present, and the disappointment of the young adult who comes to be treated too late to improve the hardness of hearing is so familiar to the medical man that it is only necessary to mention it. But because of this insidious onset, and because of the futility in many cases of late treatment, any method of early and accurate detection of slight degrees of deafness in young children is of sufficient importance to claim your attention for a short while.

It is in the hope of receiving criticism and suggestions that I venture to describe a method of testing hearing which I have used in the examination of over 3,600 children, and which I have found to give results as accurate as any clinical method can give.

It is of the highest importance that the test should be constant; and the whispered voice surely cannot remain constant when the whisperer is but human, and is examining thirty to forty children per day. The ticking of a watch, though itself invariable, leaves much chance for inaccurate results, when the child tested is, under a certain age, strangely desirous of pleasing the doctor, and, over a certain age, equally desirous of misleading the doctor.

The method I have used avoids both these pitfalls, and the results I claim to be reliable, however young the child. I think that with ordinary care and trouble on the inspector's part it can only fail in cases of very marked mental deficiency, or when a child absolutely refuses to answer. The suggestion of the method I owe to my co-worker, Dr. Grace Boelke, but I have, in using her idea, made some practical modifications, which I find have increased the value of the test as well as the facility of using it.

I use a cheap watch, of which the stem-winder, when turned the wrong way, gives a clear but not very loud clicking sound. The one in use is heard by the normal ear at about 16 ft. away. The child stands facing the examiner, and is directed to cover one ear. I usually tell the child to shut the eyes; but it must be remembered that attention is of great importance in testing hearing, and sometimes a child will more quickly pick up the sounds if allowed to have the eyes open. This is merely a question of judging by the examiner as to the child's idiosyncrasy.

The child is directed to count aloud after each click. The clicks are made at will by the inspector, and if made at irregular intervals of time the child has no chance of guessing, or if he guesses it is detected at once as a guess. This is the great advantage of making the child count aloud after each click; but another practical advantage is that in this way it is possible for the examiner to judge if the clicks are missed because of a noise or fidgeting on the part of other children, or other disturbances. I find, if the child is very young, he more willingly says "One, one, one" after each click, or moves a hand or nods the head.

Of course, the first child examined usually needs a little patience in coaching; and perhaps, unless the doctor is fortunate in selecting a bright child to start with, the test may have to be repeated a few times before arriving at a reliable judgment of the hearing-power, but after the first few children, if, as is easily arranged, each child before undergoing the test has watched three or four, I have found that even the tiny ones are able and anxious to count the clicks rightly. If the clicks are not counted rightly at the normal distance the test is applied again at distances definitely related to the normal distance, until the child's hearing is measured.

It is worthy of notice that the power of attention in a deaf ear is far less than in the normal ear. This point is markedly evidenced by this test. In connection with this point I have found it helpful to use a watch of which the click can be made softer or louder, as is found in those watches which have a small press apparatus for altering the hands. With the one I use, the click made without any pressure on the press is loud enough to be heard at 30 ft. away, and the softer normal click is made with firm pressure on the catch. It is true that this brings in an inconstant factor, on account of variability of the pressure, but with a little practice one becomes clinically accurate, and the advantages of being able to alter the loudness of the click are of great importance. Briefly, these advatages are,—

1. If a child seems to be becoming inattentive one loud click will bring him back to attention. In this way it is easy to judge if it is inattention which accounts for the missing of clicks, and reproof or encouragement by the examiner can be wisely given, helping towards the obtaining of definite results. This point is not unimportant, for children are easily upset if blamed or encouraged unwisely.

2. Emphasis may be laid on the advantages of being able to sound a loud click in the middle of quieter normal ones, because the attention of a child needs stimulating even when the child is trying hard to hear. This is better done without having to interrupt the child's train of thought by speech.

3. A third advantage of this loud click is found in the case of a child who because of slight deafness finds it difficult to hear the normal clicks, and becomes discouraged, and fails more and more to hear. This state of mind is quite common. It is to be observed even with children who are of normal hearing-power and of a nervous temperament. This is perhaps not unlike the state of mind known to candidates at examination, who, finding themselves less and less able to answer a question the longer they struggle with it, leave it for a question which they can easily answer, and thus gain a stimulus which enables them to return with success to that which had proved previously impossible.

I am emboldened to draw attention to these points because they are of importance in the obtaining of accurate results, and of practical value in the saving of time in dealing with a large number of children.

The only difficulty in the actual working of this test besides that of noises, and wind, and singing-classes, and bands, and marching out, and combined saying of tables, &c.—which are always present to the long-suffering medical inspector at our schools, and which equally affect all hearing-tests—is that of draughts. The long distance away of the child makes these difficult to avoid, but this may be overcome by some common-sense arrangement. For instance, five children may be examined, leaving all the hearing-tests to be done immediately following one on the other, and for this short time the doors may be shut. I find this procedure is welcomed by the teachers, as it is less upsetting to the class-work, and means but a few minutes longer of work missed for each child.

This test is welcomed to be pleasing to the little children, and it may become a competition when several are taken together—a competition where each candidate is keen to be right in counting. The effort of the children is thus ranged on the side of the doctor, and the results become proportionately more accurate.

SECTION OF PSYCHOLOGICAL MEDICINE AND NEUROLOGY.

Dr. R. M. Beattie (Auckland) opened proceedings of the section by reading apologies for absence from Dr. Chisholm Ross, President of section, and from Drs. W. Ernest Jones and Andrew Davidson, Vice-Presidents of section.

Proposed by Dr. R. M. Beattie, seconded by Dr. J. Sandison Yule, and passed unanimously, That Dr. C. G. Godfrey, Medical Superintendent, Royal Park Hospital for the Insane, Victoria, be Chairman of meetings of section.

THIRTY YEARS: A RETROSPECT.

PRESIDENTIAL ADDRESS IN THE SECTION OF PSYCHOLOGICAL MEDICINE AND NEUROLOGY.

By Chisholm Ross, Esq., M.D.

When by some mischance I was asked to preside in your section I made the mistake, so easily made, of taking on a responsibility for which I was unfitted. But having put my hand to the plough, let me furrow through the years indicated by the title of this paper, and make what harvest I can, though I fear it will be but gleanings, and the storehouse will be far from full. By some irony of fate, quite unsought by me, I was selected by my late esteemed friend Dr. R. B. Scholes, of Goodna, Queensland, just thirty years ago, to proceed to Gladesville, my late chief, the revered Dr. F. Norton Manning, having enlisted him in the search for a medical officer. On presenting myself to Dr. Manning I was hesitant as to my capacity to undertake work quite foreign to me, but my love of beautiful places decided me, for Gladesville then and now stands unsurpassed for the beauty of its site and its magnificently kept gardens and grounds. Deep down, too, ancestrally possibly, a metaphysical trend of thought lured me, and some instinct within me gave me courage, for I was to be associated with Dr. Eric Sinclair, now the Inspector-General of the Insane in New South Wales, to whom, with Dr. Manning, I owe most if not all of my success in life, and it is with the greatest pleasure I desire to record the fact.

It is a far cry to 1884, and much has happened since in the lunacy world of our State; and during the generation it has been one long march of progress, although hampered always by insufficient accommodation for growing needs. About this time—1884—Callan Park, the Metropolitan Hospital for the Insane, was beginning to open its wards, and in some measure to relieve the tension of overcrowding in the other hospitals. Incidentally I may add that the only institutions then in addition to those mentioned were at Parramatta, a few patients in an improvised gaol at Cooma, and the Hospital at Newcastle for the Weak-minded. Now in addition there are institutions at Kenmore, on the southern line; at Rydalmere, near Parramatta; and at Morisset, Rabbit Island, and Stockton on the northern line. In all, where necessary, adaptations have been made in terms of modern requirements, and the newer ones raised to the same standard.

Thirty years ago, excepting Callan Park, it was practically a matter of mere housing of the insane; but with our cultivated and far-seeing Inspector-General, who to a remarkable extent gained the good opinion of successive Governments and thereby had the money-springs opened more lavishly than in any of the other States, aided very materially by my chief, things grew apace. Dark and gloomy wards like unto prison recreation-yards were transformed into airy sunlit spaces, windows were enlarged, and the centres of the yards brightened by green grass in place of unsightly and undesirable gravel. The latrine accommodation was almost mediaeval in its simplicity and objections, but with the saving recognition of the uses of their contents for manuring the grounds and gardens. In effect, the beauty of the older gardens and demesnes of the various institutions is due largely to the beneficent use of human ordure. One would like to pass without review the cuisine, but the enormous change for the better makes a demand. The food was of the simplest, and the variety anything but attractive. The serving lacked almost everything that made for appetite, being served on tin plates, and eaten with protected knives and stunted forks, to say nothing of pewter spoons. The staff was little if any better treated, each member having to take his feeding-gear to the kitchen, and there run the gauntlet in order to gain the choice cuts. Milk was doled out sparingly, and, being supplied by contract, was often of inferior quality. Then, as now, vegetables were fairly plentiful, and, being supplied by the farm of the hospital, were always fresh and good. The bathing-facilities were of the most primitive order. Hot water was supplied from an open boiler; the baths were large square cement tanks, in which at times of water-stress about seventy patients were bathed, obviously not washed, in the same water. It can be well imagined that the laundry results under the circumstances mentioned could not be satisfactory, and on one occasion at least the water, always limited and of bad quality, failed, and the clothes were simply sluiced in the salt water of the Parramatta River. The lighting was in keeping with the period, and was unsatisfactory in the highest degree.

The staff, both male and female, was, on the whole, of a type which was desirable, despite long hours, comparatively poor remuneration, and the disabilities before mentioned. The sleeping-accommodation of the members of the staff who lived intramurally was simply a single room or small dormitory alongside similar quarters for the patients. The number of those on night duty was dangerously small and inadequate, and the means of communication with headquarters unsatisfactory. The male staff was comprised of indoor and outdoor attendants, the latter for farm and garden purposes. The artisans—plumber, carpenter, painter, and tailor—attended to their respective offices, assisted by such patients as belonged to the various trades or were "handy" men. On the female side the only industry was that of the sewing-room.

Apart from the medical side, there was a lay superintendent who had charge then, as now, of the outdoor work—kitchen, laundry, office, and stores. I am inclined to think that more work was done by the patients in the earlier days of my experience, and I imagine the reason was there was less industrial unrest—at Gladesville, at any rate, which received mainly country patients, who had in them a less sophisticated training, and were accustomed to the bush usages of long hours and hard work. In the early "eighties" beer was supplied to male working-patients, and not a few of the old hands were the recipients of their daily tot of rum in addition to the beer. I am satisfied, too, that there were more identities—patients who were mostly the subjects of delusional insanity of an exalted type, and who arrogated to themselves the titular distinction of the Deity, various potentates, and religious reformers. They were almost all well-behaved, useful, trustworthy persons, enjoying good health. It is perhaps a remarkable fact that the women in this category were numerous as queens, and out of proportion to the men who essayed to be kings.

Another point has been borne in upon me through the years, and I think I can claim unusual experience regarding it. It is that in my view the character of insanity has changed very considerably. Take the three great types—mania, melancholia, and dementia. I am satisfied that there are fewer acute maniacal cases, and the attacks are not so acute. The melancholiacs have increased in number, but I imagine the type is not so profound. There are, too, fewer young dements, in spite of the newly conceived item of dementia praecox, which I am glad to note has not been accepted in its entirety by Sir Thomas Clouston, who rightly, in my opinion, objects to the disappearance of the named type—adolescent insanity.

While speaking of dements a class of cases known as acute dementia, occurring invariably in young people, mostly females, and who were subclassified into anergic and stuporous forms, seem to have become rarer. General paralysis, too, has certainly altered considerably. The classic type of thirty years ago was expansively and grandiosely delusional, being comparable with cases frequently classified as simple mania. They were notoriously troublesome, and often dangerous and aggressive on account of their fancied strength, loss of sense of responsibility, and their inability to brook anything in the way of discipline and restraint. As the years have passed the type has changed remarkably, and I believe the original type has given way to a large extent to cases which have become demented without any prelude of excitement or remarkable conduct, and to others who from the beginning might really be classed under melancholia. I suppose no one nowadays believes that true general paralysis can occur without syphilis as a cause, although not many years ago very many causes were attributed, with, however, syphilis as the chief.

On the whole, there does not seem to be any remarkable increase in the number of cases, despite Krafft Ebbing's dictum that general paralysis was due mainly to two factors—civilization and syphilization. In mentioning the cause of general paralysis, it cannot be out of place to sketch briefly the causes of insanity generally as they seem to have occurred during the generation. One cause at least seems now to be practically non-existent—viz., the conditions under which bush-workers, shepherds, prospectors, and the like lived solitary lives, with often hardships, and mostly so thrown in upon their mental selves with the continuous, monotonous, ideation inseparable from their environment that they began to talk to themselves, and eventually doubled their personality in that they became listeners as well as talkers.

Again, religious revivals, although equally bizarre and emotional, have not the same causative influence; and this is difficult of explanation, for it is recognized that the victims of such revivals are mostly unstable to begin with, and there surely can be little change in the number of the emotionally unstable, who, like the poor, are always with us. It would be idle to traverse the well-trodden statistical ground in which the various causes are enumerated, as the consensus of facts varies little; but, as alcohol does not fail to be adduced as the chief factor in the production of almost any form of insanity, I think it but right to join issue and give the alcohol devil his due, and only his due.

My association with the Reception House at Darlinghurst, within the City of Sydney, has given me, apart from a score of years' experience in the Lunacy Department of this State, an unusual opportunity of seeing the true position. In glancing at the number of alcoholic cases who are dignified in the classification column of the records as mania a potu, they stand largely, but comparatively few do not recover sufficiently to be discharged after a few days, and the number who return from the same cause is comparatively small. If the truth be told, I would incline to the opinion that alcohol is more often an indirect than a direct cause, and not as affecting the alcoholic, but vicariously those dependent on him who, unequipped, are unable to fight the battle of life, and prove unequal to the stress. I cannot do better in speaking of alcohol than to cite a few pregnant and undeniably authoritative words from the pen of Sir Thomas Clouston: "It is a mistake of a somewhat common kind to imagine that alcohol is responsible for the greater part of the mental unsoundness of the civilized world. . . . That alcohol, though so common a cause of mental unsoundness in our large city populations, is not a necessary cause is proved by the fact that the alcoholic percentage goes down markedly in the country districts, reaching to only 5 per cent. in some counties; and yet insanity is prevalent in them. There is also a remarkable fact proving the same thing to be found by a study of mental unsoundness among the Society of Friends. Every one knows that this is notoriously the most restrained, self-controlled, and sober of all our large Protestant bodies." The same, he states, applies to the Hebrew race.

It is not my intention, nor is it within the scope of this paper, to discuss all the causes, nor is there any necessity, for most of them are fairly constant; nor may I embark upon the troubled sea of classification, or the bearing of heredity. I would like, however, to mention in passing what must be patent to inquiring minds—that whatever heredity there may be as a potential underlying factor, *stress* is the final lever in effecting the mental overthrow. It is recognized that there are certain persons who in spite of all stress remain sane, and it would appear that to become mentally unsound would be an impossibility. But given an heredity ill health, the various physiological crises of child-bearing, the grand climacteric in women—and not impossibly in men—congenital defects, infancy, puberty, adolescence, unsuitable and insanitary environment, overwork, morbid worry, or emotional disturbance, the individual may readily succumb under a strain out of proportion with his physical or mental equipment, or both.

It cannot be gainsaid that neurasthenia—a much abused term—has almost always a very close association with the more serious condition of psychosthenia, which lies on the borderland, with so often such a thin line of demarcation as to make it indistinguishable from true mental alienation. It may be fairly implied that the average neurasthenic and psychosthenic is not nervously stable, and that the average trend is towards such mental depression as to easily become, if it may be so expressed, a pathological melancholia.

Of all modern scourges, however, there is none perhaps so prolifically causative of morbid instability as influenza. I do not think I am overstating the fact when I say that a serious attack of influenza is potent for nervous and mental evil insufficiently recognized. It invariably has a depressing action on the central and peripheral nervous systems, and that it is selective of nervous tissue upon which to exercise its deleterious effects is beyond doubt. My impression is that every victim remains more or less vitiated, nervously if not mentally.

Little need be said of the importance of morbid sleeplessness in this connection. We are all aware of the fact that insufficient rest for our mental process is courting disaster, and that insomnia is sometimes at least more a disease than a disorder. Sleep is a habit, and sleeplessness may become one with far-reaching effects, for the exhaustion it may cause has a tendency, if not to mental unsoundness, to some profound nervous disability which makes life a further burden.

It has been for years a matter of wonder to me why our States should show the insane proportion of the population to be so out of keeping with the conditions of life here. I do not purpose entering into a statistical disquisition, but having mentioned *stress* as the most prominent causal element, it seems that such in our comparatively new country, where the conditions of life are easier than in most, must have some helping factor which remains unknown to me. When it is remembered that the average Australian is casual, if not indifferent ; that to submit to constituted authority lies in the direction of least resistance ; that, on the whole, he has few deep religious emotions, is pleasure-loving, and not fully alive to his responsibilities—should this not be all in favour of less stress, and less liability therefore to its baneful effects ?

I am afraid I have strayed far in my retrospection, leaving little time at my disposal to make comparisons between the old and the new in terms of my opportunities. In the attempt to sketch the old conditions little comment was made that it might be easier by contrast to make comparisons as found in the new. It was my privilege, after a most useful residence in Gladesville—where, in addition to my official duties, I was able to keep up general medical work by virtue of a custom that the Assistant Medical Officer had to attend the wives and families of the staff—to be sent to Newcastle, there to gain an insight into work among the feeble-minded folk, called aptly by some one " the step-children of nature." This work was peculiarly acceptable, as at that time I held the Lectureship in Psychological Medicine in the University of Sydney, and I was thus able to become familiar with all the morbid mental states. I was then transferred to Kenmore to superintend as far as possible the building of the first country institution. Kenmore remains to-day the type of nearly all that is best in asylum-construction. Then to Callan Park, a monumental pile designed at a time when the needs of the insane were not recognized as they are now, and where one came into contact with a class of patients received mainly from the City of

Sydney. I mention these facts that I may be better able to demonstrate the opportunities with which I was favoured to enable me to compare past and present.

In the first place, it will be apt to speak of the medical organization as it was at Gladesville, and as it was a type obtaining at the other hospitals it will serve. My chief (Dr. Sinclair) and I had the medical care of about eight hundred patients, and in our enthusiasm, and perhaps belief in our competency, hesitated not at major surgical operations with chloroform given in the Scottish fashion, the invariable anaesthetic, and with such antiseptic precautions as dilute carbolic acid afforded, with, of course, scrupulous cleanliness. The latter was not always easy, as the water-supply was as often as not muddy enough to be semi-opaque, the service being a dam which was filled from the drainage of the Village of Gladesville.

Among the many advances made is the recognition of the necessity and importamce of a large medical staff, and now each institution is well equipped, both in numbers and personnel. On the scientific side there is a well-equipped laboratory in charge of a competent medical officer, whose duty it is to promote his subject, and to make any necessary tests and examinations of specimens sent to him from the various hospitals. Excellent work is done, and the reports from time to time give evidence of up-to-date knowledge.

To aid their efforts nursing classes were established in the late "eighties," effecting a salutary improvement in the direction of recognizing new responsibilities for the betterment of the inmates. The inception of this reform was altogether due to my chief, and was in keeping with his general progressiveness.

To take as a type of a present-day institution our Metropolitan Hospital, Callan Park. This hospital has accommodation for almost a thousand patients, and is in charge of a Medical Superintendent, with the full powers attaching to that office. To assist him there are four medical officers, a senior and junior for each sex, and a manager for the control of the business and lay work. These are all resident officers, and the medical side lacks nothing in competence, and has besides a fortunate bias towards scientific attainment. The medical work is on the lines laid down by the most up-to-date institutions in Great Britain and abroad, with the saving grace that there is no faddism, such, for example, as I saw in one of the largest asylums in America—I refer to the prolonged hot baths for weeks at a time in the treatment of excited cases. Each patient on admission is subjected, as far as his mental condition will allow, to a thorough physical examination, and the medical records of the case leave little to be desired, and give an ample field for any collective work. In the early days the drug armentarium was somewhat limited in comparison. There were no bacterial antagonists in the shape of vaccines and the like; and the nursing of patients, though not wanting in kindness, lacked the all-desirable training which has now reached a high and wholly satisfactory development. The usual arrangements obtain as to nurses and attendants—viz., a charge attendant in each ward, with the full staff of attendants working under him, and comprising a senior, the deputy charge, and junior attendants. Above the nursing staff are the Matron in charge of the female division and the female staff, a corresponding position being occupied by the chief attendant in the male division. In addition there is a supervising attendant immediately subordinate to the chief attendant, and a housekeeper and sister in direct charge of the acute wards on the female side.

The classification of patients has been made good by having numerous wards, many of them small and on strictly hospital lines, and allowing of individual care and treatment impossible of yore. As a matter of fact, the position is that there are really two institutions in one, the division just mentioned and the asylum. Many patients under the desirable circumstances of this arrangement never see the main building, and thus in some measure the so-called stigma does not attach to any extent.

There is also a sick-hospital, well equipped with a laboratory for clinical and pathological work, and in charge of a competent staff. One feature which has been found to work admirably is that nurses instead of attendants are largely employed in the male ward for new admissions, thereby carrying out the hospital ideal as far as possible.

In these democratic days it need not be said that the employees have gained enormous advantages in the direction of better food, increased pay, and considerable leave. With the first we need not have any quarrel, and faithful work during shorter hours has an opportunity of being demonstrated. But a system which allows of two days on duty and the third off, with the addition of three weeks' annual leave, has manifest objections. For instance, it does not allow, in my view, of the intimate knowledge and interest in patients which obtained under the old system.

As this has become a somewhat discursive paper, may I for a moment speak of two institutions which are under the aegis of the Lunacy Department, and which in their own sphere do excellent work? First, the Reception House for the Insane was, I think I am right in saying, devised by the late Dr. F. Norton Manning, and the building bears date so long back as 1867. Some improvements in the light of modern requirements could be made in its internal economy, but, as a whole, the design of the building reflects great credit on the foresight and ability of its author. It has accommodation for both sexes, and receives patients from over the whole State. It acts as a filter, and many patients after a short sojourn there recover, and thus avoid certification. As the Visiting Medical Officer to it, I am able to state with knowledge that such an institution is imperative in any large centre of population. Attached to it a Court for dealing with patients is held almost every day, according to the needs, and is presided over by a Stipendiary Magistrate. This makes for privacy, as the public are not admitted—an eminently desirable consideration. Second, a sort of half-way house is to be found in what for a want of a better name is called "the Mental Hospital." Borderland cases are admitted to this hospital, the staff is female, and attached to it are three honorary medical officers. The patients are not certified, and there is no power of legal detention. On the whole, it has proved a success, but there is always the difficulty of choosing suitable cases, it being conducted on the open-door system, and there is a tendency for malingerers to exploit its benefits. As a custom, alcoholics are not eligible for admission.

These two institutions, therefore, meet in some measure the need so much discussed of late—viz., mental wards in relation to general hospitals. Personally, after my experience of the Reception House and of the Mental Hospital, I incline strongly to the view that the most desirable and promising scheme would be that for any patient who needed mental treatment admission should be made easy for his reception into a hospital for the insane without certification. He would, as Esquirol a century ago said, get the immediate benefit of "that instrument of cure," a well-equipped institution in time; and under such circumstances the "stigma" would fade all round, malingerers would soon find that their metier had been taken, the patients having found voluntary sanctuary would be content, suicides would be rarer, and from a statistical point of view at least the increasing registered number of the insane would not loom so large.

I am afraid I have wandered rather aimlessly from the Dan of thirty years ago to the Beersheba of the present moment; but the years almost all spent in this special work have been full of pleasure, interest, and education for me, and my attempt to bridge over the space by reminiscence perhaps has in your kindness and courtesy found some passing interest.

THE UNIVERSAL RECOGNITION BY MEDICAL SCHOOLS OF PSYCHOLOGY AND MENTAL DISORDERS AS A COMPULSORY SUBJECT.

By ANDREW DAVIDSON, M.D. (Aberdeen), Sydney.

MEDICAL men, as all other individuals do, live in a world full of changes. One day the university powers that be draw up a medical curriculum that for the time being seems perfect; but the very next day some new idea is born, and as it grows it is seen and admired by a few, and ere long the once perfect curriculum is doomed to alteration, though the conservative powers who hold the reins delay and delay, till finally their hand is forced.

As time as gone on, many subjects that formerly were looked upon and taught as subdivisions of one main branch of medicine have severed their connection with this parent, and have been taught quite apart from the main branch by men who have devoted their work specially to this subject. With this separation has come extended tuition, extended to bounds which seem to have no real boundaries, for, instead of one main branch, such as surgery, with several subdivisions such as diseases of the eye, diseases of the ear, nose, and throat, &c., has come the separation of these subdivisions from the main branch, with separate teachers and separate examinations. Formerly the examination in surgery would, either at written or practical, include some reference to these special branches, but with the separation all reference to these was omitted in the examination in surgery. However, a revulsion has taken place, and the attendance at the teaching of these special subjects has become more or less voluntary on the part of the student, and the examination gone, so that a graduate may now win his spurs with a more complete knowlenge of general surgery, but with little (if any) in the special subjects referred to. All that has just been said applies not only to surgical matters, but also to medical, and to none of these medical subdivisions more markedly than to mental diseases. At Sydney University up till six years ago the student had to receive instruction and had to be examined in this subject, but at that time the revulsion took place, and the subject became a voluntary one as far as attendance at lectures and demonstrations was concerned, with no examination.

One may suggest that the reason for this was the feeling of anxiety that this special examination might become too special, just as a student is examined in anatomy or in physiology as if he were to specialize in these subjects rather than practice medicine. If so, the cure for this evil has been too radical, and the training of the student in a very necessary branch thrown back, and generally obscured.

Not only has the subject of mental and nervous diseases suffered at the hands of the medical schools, but also at those of the staffs of the general hospitals, to whom the early stages of these diseases are always in evidence. It is not now one's object to advocate the arranging of special departments in general hospitals for the treatment of mental and nervous diseases in their early stages, for this was done at last Congress in Sydney. Perth for some time has dealt kindly with its early insane, Adelaide is following Perth's example, but Sydney is still dormant. However, this will come to all general hospitals when the teaching authorities of the different schools uniformly agree that the subject of psychological medicine is of such importance that no student should graduate without having had some teaching (practical or otherwise), and without having passed some form of examination. It is not necessary that this examination should be of an elaborate character, yet sufficient to show that the graduate possesses such knowledge as will permit him to recognize the different forms of mental diseases, with their more common causes ; to treat on scientific lines their early stages ; to recognize the types of mental disease associated with dangers to patients themselves and to others ; to give useful assistance to different Departments, such as Education, Prison, or Benevolent, when matters are referred by these Departments for opinion ; to know when to send a patient to a hospital for the insane ; and to appreciate how his affairs (if any) are to be managed when this is done. Knowledge such as this all men going into general practice should be conversant with, for it is necessary not only as far as the patient is concerned, but also from the practitioner's point of view.

When the teaching of psychological medicine again becomes compulsory it is expected that with this will come the establishment, at each general hospital attended by medical students, of a special staff for the treatment of those suffering from mental and nervous disorders as indoor and outdoor patients. By this means, and by this only, will the teaching of all the details as to the early stages of mental diseases be placed on a thoroughly practical and scientific basis. The student will thus see the stage of the disorder he will treat in general practice, instead of as he now does, when he has placed before him the disease well developed and the patient committed to a hospital for the insane, and therefore beyond the point up to which the general practitioner may with safety treat.

At certain universities in different parts of the world a diploma in psychological medicine has been established. Edinburgh, Cambridge, Manchester, and Leeds are amongst those that have done so, and the Medico-Psychological Association of Great Britain has to a very great extent assisted in the acceptance by these universities of this necessity. It is becoming generally felt that the establishment of such a diploma will raise the standard of the medical attainments of those who have decided to give their life's work to the treatment of the insane, and to the investigation from a scientific point of view of nervous and mental diseases. It is also essential that those whose duties are under the guidance of the Education, Prisons, and Benevolent Asylums Departments should have this special post-graduate training, for at every turn in their day's work they have to decide and give an opinion as to the mental condition of some individual, occasionally matters of the greatest importance, even of life and death, having to be decided.

Over and above the economic value which may be obtained from the granting of this means of further study, the advantages that will be obtained from the stimulation of research in advancing our knowledge of the nature, and therefore of the treatment, of nervous and mental diseases must always be borne in mind. The medical man ceases to work in the dark; and if he comes in contact with some condition of more than ordinary interest, and wishes to impart this knowledge to his fellow-medicals, what he writes will be built on a solid foundation, and show evidence of his own authoritative knowledge of the rudiments of the subject he discusses.

May one, in conclusion, hope that hospitals attached to every teaching school will have special wards for the early mental and nervous diseases, that each school will compel its students to "walk" these wards and be taught and examined on the subject of psychological medicine, and that for those whose duties are to take them much in contact with mental and nervous diseases a further post-graduate course of study with diploma will be established. Thus will be answered in the affirmative the question, "Should the teaching of mental and nervous diseases be compulsory at medical schools?"

DISCUSSION.

Dr. R. M. Beattie (Auckland) said,—I am heartily in sympathy with the views expressed by Dr. Davidson, chiefly because it is, in my opinion, quite essential that all medical men should be trained in psychological medicine to enable them the more readily to diagnose the different forms of insanity in the early stages—at those stages when one can hope for recovery, and in which one can give the patient and his friends a hopeful prognosis. Not only is it necessary that he should be able to make an early diagnosis, but he should also be able to understand and compel the necessary treatment so far as that can be successfully carried out in the private homes of the patients. I am sure that if the proper attention were given to this subject in the medical schools much suffering and much of the hopeless insanity would be done away with. It seems specially necessary for New Zealand practitioners, in view of the fact that our recent Lunacy Act places in the hands of the ordinary practitioner the power of certifying to the sanity of probationer patients—I think an unwise if not a dangerous provision.

A letter was read from Dr. Boyd (Auckland) to Dr. Valintine, Inspector-General of New Zealand Hospitals, advocating the establishment of wards in general hospitals for incipient insanity cases, and Dr. Valintine's reply thereto.

The necessity for adopting such a course was illustrated with a case.

The discussion was joined in also by the Chairman.

THE PSYCHOLOGY OF DEMENTIA PRAECOX.

By John K. Adey, M.B.,

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The name "dementia praecox" is in many respects an unfortunate one. Kraepelin states that 20 per cent. of his cases recover, and, considering that it may occur up to the age of forty, the name "dementia praecox" is hardly a fitting title. But, in spite of this, dementia praecox is a very definite clinical entity, with characteristic mental abnormalities, and the name should be taken to indicate two very important facts—(1) That the chief symptom of the disease is a pronounced tendency to mental deterioration, more or less complete; (2) that this deterioration appears very early in the course of the disease, and is not an after-effect, as in cases of secondary dementia. The word "praecox" can be taken to indicate "early in the disease," instead of "early in life."

Besides the very evident increasing enfeeblement, the most prominent symptom is abnormality of the will-power; and in the same way that mania and melancholia can be taken as fundamentally diseases of the emotions, so dementia praecox is marked by disturbances of volition.

I shall, therefore, first consider the psychology of the normal will-power. If a normal man performs a certain action, as, for instance, dining, the following may be considered as roughly his psychological condition: (1) First, he wishes for dinner owing to his feeling of hunger; (2) he then considers why he should not have it—the facts that he has work to finish, that it is not yet time, &c., arise in his consciousness, causing what might be called the "inhibitory influences" against his going to dine; (3) the result of the balance of these opposing forces is that he either has dinner or, what is just as much an act of volition, refrains from having it; (4) finally, having made his decision, he turns his attention in another direction.

One may therefore sum up by saying—(1) A consideration of the pros and cons; (2) the result; (3) change to another action.

In dementia praecox disorders of volition may arise at any of these stages.

(1.) The simplest case is that in which a patient has no wish to do anything. He is apathetic, and has a total lack of initiative. When made to do something he does it; when left to his own resources he does nothing.

(2.) In the next condition he himself has no volition, but is abnormally suggestible to outside influence. This suggestion may come by word of command, which is rare, but more frequently he is suggestible to outside movement. Thus when his arms are extended above his head he takes this as a suggestion, and keeps them there (catalepsy). Some are suggestible by example, which accounts for echolalia and echoprasia, where the patient imitates the actions of the doctor or repeats his words. This means that the patient, having no volition of his own, is only too ready to pick up a suggestion from outside sources.

(3.) With regard to the inhibition, which occurs to a certain extent in every normal action: This inhibition may be deficient, so that the patient is impulsive. No sooner does he think of an action than he does it; no restraining influence of any kind has any effect upon him.

Hence many cases are extremely impulsive, and smash and break furniture, scream, and behave in a generally objectionable manner. At the opposite extreme the inhibition may be so great that no sooner does a patient wish to do anything than the contrary at once becomes so strong that he must do the opposite. Hence arises the condition of negativism, of opposition, and of active resistance to suggestion. He resists getting up, resists his food, resists putting on his clothes, and resists having them taken off, all on account of the fact that the inhibition is stronger than the volition; and in some cases this may account for the fact that the patient is constantly dribbling, for when he wishes to swallow his saliva he is unable to do so. In extreme cases this may lead to the retention of urine and faeces, which may or may not be ultimately overcome by the reflex.

(4.) When the normal man has completed or rejected an action he at once turns his attention to something else. In dementia praecox he may be unable to do this, hence the conditions of stereotypism, verbigeration, &c. Some patients will repeat words over and over, will walk round and round in a circle, will keep on eating from an empty plate, and so on. This lack of desire for change may possibly account for some of the conditions of catalepsy, in which a patient will remain with his arms outstretched until fatigue causes them to drop. Of such patients it may be said that they continue in a state of rest or of uniform motion until acted on by some external force.

These various disturbances of volition will help to account for many of the peculiarities of dementia praecox, and I shall now consider the various forms with regard to disturbances of the will. Kraepelin has divided it into—(1) hebephrenic; (2) catatonic; (3) paranoid; and to these has been added a fourth, or rather a first, class of simple dementia praecox.

Always remembering that every case has the fundamental characteristic of an early tendency to mental deterioration, more or less complete, we may say that—(1.) Simple dementia praecox is characterized by the tendency to dementia with apathy, little volition of any description, increasing lack of initiative, and there may or may not be mild delusions. (2.) The hebephrenic form is characterized by a lack of inhibitory functions; the patient is violent and impulsive, acts on any suggestion, and frequently performs silly acts for which he can offer no adequate explanation. (3.) The catatonic form shows the most marked disturbances of volition, in that inhibition is increased or disordered; these patients show stupor, catalepsy, negativism, stereotypism, verbigeration, &c., all to be more or less satisfactorily explained by a disturbance of the normal balancing of the active and inhibitory influences that regulate the conduct of every normal person. (4.) The fourth or paranoid type does not necessarily show any disturbance of volition, but is rather a combination of defective judgment, and hence delusions, with mental enfeeblement.

To sum up we may say that the four forms of dementia praecox are characterized by—(1) Simple, by lack of volition; (2) hebephrenic, by lack of inhibition; (3) catatonic, by increase of inhibition; and (4) paranoid, by no special disturbance of volition beyond that caused by enfeeblement.

There is no doubt that all forms of insanity show disordered conduct, but dementia praecox is peculiar in that the conduct does not appear to be in harmony with the rest of the mental picture. According to some authors there is a "splitting of the personality," and hence no co-ordination between the various mental functions. His will is not ordered by his feelings or emotions, and he commits acts for which he can offer no explanation. Most forms of insanity have a certain amount of logical reasoning, as a melancholic will attempt to commit suicide because he is unhappy, or a paranoiac will smash a window because some one behind it is spying on him. A dementia praecox case will try to hang himself with a silly smile on his face, and will smash a window for no apparent reason whatever. This "splitting of the personality" makes it extremely difficult for a sane man to realize the condition of the patient, and is probably more apparent than real; and if we could fully understand the state of the patient's mind we would possibly find that the underlying condition accounted for his peculiar actions, and that they were not really at variance with the rest of his behaviour.

I shall now briefly discuss some of the other symptoms of dementia praecox, with reference to its contrast with other forms of insanity.

In manic-depressive insanity the fundamental disturbance is that of the emotions. In dementia praecox there may be a certain amount of emotional disturbance, but it is usually transitory, and does not appear to be the real cause of the disorder. A very important diagnostic sign between the early stages of melancholia and dementia praecox is the presence of vivid hallucinations, which are much more frequent in the latter. A melancholic will hear voices telling him that he is wicked, but on inquiry one finds that the voices are vague and indistinct, and are not like real voices, but are, as it were, "the voice of conscience" reproaching him. On the other hand, dementia praecox may have vivid and realistic auditory and visual hallucinations, and be quite convinced that the devil was in his room talking to him.

Delusions are present in nearly all forms of dementia praecox, and are not by any means confined to the paranoid type. These delusions are usually of the persecutory or expansive type, and are distinguished from those of a paranoiac by the fact that they are usually unsystematized.

The delusions of a paranoiac are not usually absolutely silly, and are worked up into a system with more or less logical reasoning in them. On the other hand, a dementia praecox has ridiculous delusions, and they are usually fleeting and unsystematized. One day he is one exalted personage, and the next day the devil, and in this respect he resembles a general paralytic.

Theories of the Psychological Condition.—One school is inclined to attribute the symptoms of dementia praecox to a disturbance of the metabolism due to some internal toxin, possibly to some disorder of the internal secretions of the sexual glands, hence the frequent onset at the time of puberty.

Another school considers that it is a manifestation of the "shut-in" personality—that is, in people who are reserved during childhood, do not readily make friends, brood over their wrongs, and may show a precociously religious sensitiveness, and a certain amount of difficulty in adapting themselves to the difficulties they may meet with in the course of their lives. Consequently, at the time of puberty they are unable to face the added difficulties in the struggle for existence, and so are unwillingly forced to seek a refuge in the calm surroundings of an asylum.

DISCUSSION.

Dr. R. M. Beattie (Auckland) said,—This term introduced by Kraepelin has probably come to stay, at least for a time. The amount of controversy it has aroused shows, however, that it has not met with universal acceptance. Personally, I never certify a case, because it seems to me difficult if not impossible to properly diagnose a case until one has had it under observation for a considerable time. It should be understood that the word "dementia" has not the same meaning in Germany that it has in England. As we understand it, it represents a hopeless condition; yet we know that cases that can clearly come within Kraepelin's definition do recover, and I have myself seen cases so recover, even after a laspe of nine years, with only slight permanent mental impairment. I cannot really believe that a term which embraces certain forms of mania, melancholia, stupor, catalepsy, &c., can permanently exist; and until a definite pathology has been demonstrated I prefer to adhere to the old term "adolescent insanity."

Dr. James Boyd (Auckland) drew attention to suggestion and loss of volition in both dementia praecox and hysteria. According to Yung, of Zurich, the mechanism in the production of hysteria and dementia praecox are identical, with the exception that in the latter the symptoms seem to get fixed in the brain by some toxin.

THE NATURE OF THE MIND: A CRITICISM.

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The task which I have undertaken in the present paper is a critical examination of certain current views on the nature of the human mind. I have selected for my purpose the expression of these views as stated in Dr. Stoddart's text-book, "Mind and its Disorders,"(1) for the reasons that they are probably stated therein as clearly and definitely as in any other treatise, and because it is, deservedly, a widely read and popular book.

Those who are acquainted with the history of psychology will not need to be told that the psychological doctrines outlined in Part I of "Mind and its Disorders" are not the original views of its author. Dr. Stoddart is an adherent of the "interactionist" and sensationist schools of psychology. A few quotations will serve to make his standpoint clear :—

(1.) "According to the 'interactionist' school, 'mind' is not to be regarded as a 'thing,' but 'mentation' is to be regarded as a 'process,' having its physical basis in the brain. This is the scientific view of the present day, which will be adopted throughout this manual" (p. 2).

(2.) "In our further considerations it will be shown that mind, with all its higher functions of memory, discrimination, will, reason, &c., can be evolved from sensation experiences alone, without invoking the aid of a 'thinking principle,' 'apperception,' or any other form of intellectual spontaneity" (pp. 9, 10).

(3.) Mind is "that faculty or function in us by which we become aware of our surroundings and their distribution in time or space, by which we experience feelings, emotions, and desires, and are able to attend, to reason, and to decide" (p. 7).

So we arrive at the illuminating conclusion that there is something in us which is not a thing, but a process, or faculty, or function which enables us to exert mental activity, and that the higher functions of this function can be evolved from sensation experiences alone, &c. All adherents of interactionism do not explain it in the same way; but if we accept Dr. Stoddart's explanation—that it means that mentation is a process—to what extent are we really the wiser? Unless we are satisfied with mere words we gain nothing whatever by being told that "mentation is a process." What kind of a process is mentation? From what does it "proceed"? It is no answer (other than a verbal one) to say that it is a mental process. What is a mental process? The interactionist definition will not help us much. Professor Titchener tells us(2) that a mental process is a process "which goes on inside of you, so entirely inside of you that you are the only person who can ever get at it and observe it." This is a mere restatement of the problem, for it leaves us still entirely in the dark as to the nature of the "you," inside of which the process goes on. Dr. Stoddart's statement that mind is a faculty or function leaves us in the same difficulty. If mind be a function it must be a function of something, and if there be no "thinking principle" it must be a function of the brain—in other words, a function of matter, which reduces interactionism to absurdity. But granting that "mind is that faculty or function in *us* by which *we* become aware," &c., the very *nodus* of the whole problem is still left unsolved. What is it that becomes aware, that reasons, wills, understands?

So much for interactionism. From the second quotation which I have given above from "Mind and its Disorders" it is evident that Dr. Stoddart is an adherent of the sensationist school. The views of this school date very far back in the history of psychology. Some of the leading sophists of the fifth century B.C. were sensationists. Protagoras taught that sensations were the sole content of consciousness. Coming down to a time nearer our own we find Condillac (1715–80) teaching that "the ego of each man is only a bundle of the sensations he experiences and of those which memory recalls." He illustrated his views by his famous example of the imaginary growth of consciousness in a marble statue as it received one by one various sense-faculties.

"Sensation," says Dr. Stoddart (p. 9), "is essential to consciousness." In what follows he uses "consciousness" in two quite distinct senses—(1) as opposed to unconsciousness, as in fainting, deep sleep, &c.; and (2) as synonymous with mind. In whichever of the two senses the term be used I join issue with him.

(1.) Obviously no sensations are perceived in deep sleep, fainting, anaesthesia, &c. But which is cause and which is effect? Is the patient unconscious because he does not feel a pin-prick, or does he fail to feel the pin-prick because he is unconscious? A sensation may be described as "an elementary psychical state aroused in the animated organism by some exciting cause"(3). "*La sensation . . . est une manière d'être du sujet sentant, un changement d'état destiné à le renseigner sur quelque chose*"(4). There can be no sensation when that which is capable of experiencing sensation—viz., consciousness—is for the time being in abeyance. It were just as true, then, to say that consciousness is essential to sensation, as to say that sensation is essential to consciousness.

(2.) If consciousness be taken as synonymous with mind, again Dr. Stoddart's conclusion must be rejected. From the condition known as "idiocy by deprivation of the senses" he concludes that "they experience fewer sensations than healthy children, and are *therefore* mentally deficient"(5). Dr. Stoddart himself admits elsewhere(6) that these patients may by training attain a fair degree of mental development. The case of Helen Keller is well known. She was born deaf, dumb, and blind; yet, says Seashore(7), "her intellectual life is more intense and more cultivated than that of the average university graduate." I am not arguing from these considerations that sensation is not an important element in mental development. Mental life undoubtedly begins with sensation, and other mental states are built upon and presuppose sensation. But I altogether deny—and I hope to substantiate my position in what follows—Dr. Stoddart's contention (which, of course, is the contention of the sensationist school generally) that sensation is "the *only* essential attribute of conscious organisms." If this were so the people who have the most acute senses should be the most intelligent, which is certainly not the case. It will be seen presently that in explaining the higher activities of the mind, Dr. Stoddart implicitly assumes (as all sensists do) the existence of the very thing he sets out by denying—a thinking principle superior in its scope to mere sense.

I now proceed to the examination of the account which Dr. Stoddart gives of various activities of the mind.

Perception and Ideation.

We are told (ch. iii) that "When I have an object before me—*e.g.*, an orange—I have a *percept* of it; when I think of an orange I have an *idea* of it. . . . There is practically no psychological difference between these two processes, their chief difference being physiological"—*e.g.*, "percepts are aroused by stimulation of the corresponding sensory end-organs, while ideas are aroused by way of association fibres." Now, granting that there is this difference between the physiological concomitants of the percept and the idea (or, as I should prefer to call it, the *image*) it is difficult to understand how any one can maintain that it is the chief difference, and that there is "practically no psychological difference." On the contrary, I contend that there is a wide and important psychological difference between the two. An idea is much less vivid than a percept. Perception is dependent on the presence of real external objects, while an idea may be present to consciousness without the actual presence of any external object. The idea is subject to the control of the will; the perception of external objects is independent of the will. And, most important of all, perception involves reference to external reality, a belief in external independent existence, which is absent in the case of the idea. Inability to distinguish between a percept and an idea constitutes hallucination—a phenomenon which I venture to think is of some practical psychological importance. Moreover, perception implies something more than mere experience of a number of sensations. Take Dr. Stoddart's example of the orange: If I merely experience sensations of roundness, coldness, yellowness, &c., that does not constitute a percept. I must, by an active effort of the mind, refer those sensations—which by themselves are meaningless—to their object. Perception involves synthesis of present sensations, of present with past sensations, and this implies the existence of some faculty distinct from sensation. This is implicitly admitted by Dr. Stoddart: "When *I* hold an orange before me *I* experience sensations." When I see an orange I form a judgment: this round yellow thing is an orange. I bring into play a mental activity essentially distinct from sensations, and which cannot be confounded with them without destroying the idea of comparison, and rendering it impossible.

Conception.

Dr. Stoddart defines a concept thus: "When from a number of percepts or ideas an abstraction of some quality or series of qualities is made and the qualities are recombined, the result is a concept." Thus "an orange concept is a recombination of a large number of orange percepts." This is a restatement of the old sensationist error of confounding the concept and the image. If I form a recombination of a large number of orange percepts, I do not form a concept at all; I merely form a concrete mental image of *an* orange.

A concept is something very different. Dr. Stoddart makes the concept a generic image; his abstraction is a mere sense-abstraction of a quality or group of qualities. The concept is abstract, but in a totally different sense. In forming the orange concept, for example, the object abstracted is related mentally to *every* concrete orange, no matter where or when it may be found. When we say, "The orange is a fruit," we mean *any* orange; the expression has a connotation which is grasped by the mind, and that connotation as thus grasped in a mental act is the concept. If we could think only of concrete objects no one of them would be indifferently attributable to *all* concrete specimens of those objects. The concept is therefore abstract. It is the imagination which pictures the orange "concept" in Dr. Stoddart's sense; in the true concept the intellect thinks the universal, and this thought is the concept. The concept is universal because it applies to all possible concrete specimens of the object. Its universality consists in the fact that by an act of reason we can identify it with concrete objects in unlimited number. The concept, then, is not the abstraction of "some quality or series of qualities from a number of percepts"; it is the abstraction of the features that are absolutely essential to the object, and therefore common to all objects of the same kind, leaving out all unessential and particular features.

A further proof may be drawn from language. I see apples, oranges, pears, bananas, &c.; I think of the word "fruit." Conversely the word calls up images of apples, oranges, &c. Why? Because the word expresses certain characters common to all fruits. These characters are an abstraction, of which the word is the expression. If it were not for this abstract meaning of terms there could be no exchange of ideas between us. That two intelligent beings may understand each other, both must conceive the same ideas at the same time in relation to the same object. Further, the intellect is not restricted to material objects. We can grasp intellectually such immaterial ideas as abstract numbers; ideas like those of morality, unity, relation, causality—all outside the scope of sense. We perceive the relationships expressed in the use of the conjunction " therefore," and the copula " is." I can grasp intellectually what is meant by a chiliagon, though I may never have seen one.

There is something more involved in all these conceptions than mere combination of sense-perceptions. There is implied a power of abstraction and generalization. Universal ideas, abstract intellectual relations, and axiomatic truths do not possess actual concrete existence, and so cannot produce impressions on sense-organs. But they are apprehended by us; therefore we must possess some suprasensuous faculty. And, again, as in the case of the percept, we find that Dr. Stoddart's words imply some faculty: " When *we* abstract . . . *we* have a conceptual orange." " When *I* form a concept . . . ." What abstracts, what forms the concept, if there be no " thinking principle " ?

If there is no higher central mental activity to which, in the case of the orange, the various sensations of roundness, yellowness, &c., are present, how can any one of these be abstracted from the others ? What is there to do the abstracting ?

Attention.

" Attention is that process by which the organism is placed in the attitude best adapted for the reception of the stimuli arising from an object attended to or noticed, whereby the perception of such object becomes clearer and more distinct in consciousness." (" Mind and its Disorders," p. 77.)

There is a fundamental fallacy in this definition; it assumes that the only things the mind can attend to or perceive are material objects. It might stand if we were capable of no other form of attention than that which we possess in common with the cow and the hen. But the human mind is capable of a higher form of attention than that. To Dr. Stoddart's definition I will oppose this: " Attention is the special direction of the higher cognitive energy of the mind towards something presented to it." Attention is not confined to physical stimuli, but extends to feelings, actions, and knowledge. If there were nothing more in attention than is implied in Dr. Stoddart's definition, " attention would be nothing but the act of feeling; all sensation would be attention, and all attention sensation; a meaning which no one ever yet gave to these words. Attention is the application of the mind to some thing; and this application supposes the exercise of an activity concentrated upon its object "(8). If we accept the definition given in " Mind and its Disorders," then those who felt most vividly would be the most attentive, which is contrary to all fact and all experience. Lotze's remarks on attention are so much to the point that they are well worth quoting here: " The consciousness of the relations existing between the various single sensations (among which we reckon here the sum formed by the sensations when united) is not given simply by the *existence* of these relations considered simply as a fact. So far we have considered only single ideas, and the ways in which they either exist simultaneously in consciousness or else successively replace one another; but there exists not only in us this variety of ideas and this change of ideas, *but also an idea of this variety and change*. . . . Just as the external sense-stimuli serve to excite the soul to produce simple sensations, so the relations which have arisen between the many ideas, whether simultaneous or successive, thus produced, serve the soul as a new internal stimulus stirring it to exercise this new reacting activity. When two ideas, *a* and *b*, have arisen as the ideas 'red' and 'blue' they do not mix with one another, disappear, and so form the third idea, *c*, of 'violet.' If they did so we should have a change of simple ideas without the possibility of a comparison between them. This comparison is itself possible only if one and the same activity at once holds *a* and *b* together, and holds them apart, but yet, in passing from *a* to *b*, is conscious of the change caused in its state by these transitions; and it is in this way that the new idea, γ, arises, the idea of a definite degree of qualitative likeness or unlikeness in *a* and *b*."

Again: "If we see at the same time a stronger light, *a*, and a weaker light, *b*, of the same colour, what happens is not that there arises in place of both the idea, *c*, of a light whose strength is the sum of the intensities of the two. If that did arise it would mean that the material to which the comparison has to be directed has disappeared. The comparison is made only because one and the same activity, passing between *a* and *b*, is conscious of the alteration in its state sustained in the passage; and it is in this way that the idea arises—the idea of a definite quantitative difference. Lastly: Given the impressions *a* and *a*, that which arises from them is not a third impression $= 2a$; but the activity, passing as before between the still separated impressions, is conscious of having sustained no alteration in the passage; and in this way would arise the new idea of identity. We are justified in regarding all these different instances as ideas (concepts) of a higher or second order. They are not to be put on a line with the ideas (images) from the comparison of which they arose."

Again: "My immediate object is to indicate what happens at least with such clearness that every one may verify its reality in his own internal observation. It is quite true that, to those who start from the circle of ideas common in physical mechanics, there must be something strange in the conception of an activity, or (it is the same thing) of an active being, which not only experiences two states, *a* and *b*, at the same time without fusing them into a resultant, but which passes from one to the other, and acquires the idea of a third state produced by this very transition. Still, this process is a fact; and the reproach of failure in the attempt to imagine how it arises after the analogies of physical mechanics falls only upon the mistaken desire of construing the perfectly unique sphere of mental life after a pattern foreign to it. That desire I hold to be the most mischievous which threatens the progress of psychology"(9).

So far, then, from attention being "a motor reaction placing the organism in an attitude," &c.(10), the reaction and the attitude are consecutive to attention, not constitutive of it.

Judgment and Reasoning.

A careful consideration of these two activities of the mind will show more clearly than anything else the utter hopelessness of attempting to build up a satisfactory psychology on the basis of sensism. "A judgment, we are told, is formed when an abstraction is made from any percept, idea, or concept, and the abstraction recombined or associated with the primary percept, idea, or concept. In other words, a judgment is an association after disjunction. When I *think* of gold being yellow, I abstract the yellowness quality from the gold-concept and reassociate the yellowness with the gold. A judgment is therefore nothing more than a special form of association ; the yellowness is merely associated with the gold instead of with daffodils, the skin of a Chinaman, or what not"(11). Once more we find the existence of a special faculty of elaboration implicitly assumed. As a consistent sensationalist Dr. Stoddart is bound to account for the higher activities of the mind " from sensation experiences alone, without invoking the aid of a 'thinking principle.' " But in his account of judgment we find him tacitly assuming the existence of such a principle. For how are comparison and judgment possible at all otherwise ? The abstraction and the reassociation must be done by something. What abstracts the yellowness from the gold-concept, reassociates it with the gold, holds together at the same time the two ideas—gold and yellowness—compares these two ideas, discerns the relation between them, affirms their agreement (this is the judgment), and *is at the same time aware that the mental juxtaposition of ideas corresponds to the objective reality ?* How can " mere " reassociation produce comparison, perception of agreement or disagreement, *and* the judgment ? Abstraction and association are not passive mechanical phenomena going on in a subject devoid of all initiative ; they do not abstract and associate themselves without the intervention of a superior force. " Neither the mere coexistence, nor still less the successive occurrence of two impressions, could ever result in the perception of a relation between them unless there be a third distinct activity of a higher kind to which both are present, and which is capable of apprehending the common features "(12). Dr. Stoddart confounds the coexistence of two percepts (or ideas, or concepts) with the *perception* of their agreement or disagreement. The coexistence of two percepts cannot possibly result in a judgment unless there is a distinct activity to which both are present *during the whole operation.* This is tacitly admitted in the very words of Dr. Stoddart's definition : "When *I* abstract . . . *I* reassociate . . ." The example given by Dr. Stoddart, "gold is yellow," is one of a simple, immediate, concrete judgment.

When we turn to judgments of another kind—analytical, necessary, or universal judgments—the case against sensism is still stronger. The judgments of the moral law, the principle of causality, the axioms of mathematics—these are affirmed by the mind as necessarily and universally true. The perception of their truth cannot be the outcome of mere reassociation after disjunction. Association and disjunction can be applied only to the individual, the concrete, the contingent, the mutable. Necessary judgments are objectively true. They are independent of our perception of them. They hold for all intelligence ; they must be necessarily and everywhere true. But this necessity cannot be apprehended by sense. Sense cannot inform us that a universal truth holds ; it can only inform us that a particular fact exists.

But even in such a simple judgment as " Gold is yellow " it is impossible that the relations between the subject and the predicate be perceived unless the same agent perceive the two terms of the relation—without this the perception of logical relations is impossible. As Lotze so well puts it, " Any comparison of two ideas which ends by our finding their contents like or unlike, presupposes the absolutely indivisible unity of that which compares them : it must be one and the same thing which first forms the idea of *a*, then that of *b*, and which at the same time is conscious of the nature and extent of the difference between them. Then, again, the various acts of comparing ideas and referring them to one another are themselves in turn reciprocally related ; and this relation brings a new activity of comparison to consciousness. And so our whole inner world of thoughts is built up not as a mere collection of manifold ideas existing with or after one another, but as a world in which these individual numbers are held together and arranged by the relating activity of this single pervading principle "(13).

Most of what has been said concerning judgment is equally applicable to reasoning. "Reasoning," says Dr. Stoddart, "consists of a series of judgments (verbally, a series of propositions) related to one another, the last term of the series being a conclusion dependent, rightly or wrongly, upon the preceding judgments or propositions "(14).

This definition is inaccurate and incomplete. Reasoning is my perception of a relation of dependence between two or more judgments. It is a mental operation by which we derive a new judgment from some other judgment or judgments previously known. It always includes two elements—(1) a universal element or law, and (2) a more special instance or application of that law. Just as in the case of judgment, it is impossible to give a satisfactory account of reasoning without supposing the existence of a higher mental activity capable of perceiving the relation between two or more judgments. It is radically impossible to conceive a psychic life at all without the presence and active intervention of a subject which compares its impressions and its acts, and is capable of associating or dissociating them : if there is no "thinking principle," no "apperception," then there is no psychology at all.

"*La conscience,*" writes Pierre Janet(15), "*est essentiellement un effort vers l'unité, une force synthétique . . . L'activité est une propriété fondamentale de la vie consciente, puisqu' il faut constamment supposer une force qui maintienne ensemble les divers éléments de la conscience et en fasse par leur union le contenu d'une seule et même conscience.*"

Again, Wundt writes(16) : "*La thèse de Hume, d'après laquelle notre âme n'est qu'un faisceau de représentations, est inadmissible. Elle est née de cette opinion, que les représentations s'unissent d'elles-mêmes, ou par une sorte de hasard suivant des rapports internes et externes. On oublie une condition sans laquelle aucune association n'apparaîtrait a la conscience, à savoir l'* apperception, *que nous saisissons immédiatement comme activité interne.*"

Neither the perception of objective reality, nor judgment, nor reasoning, nor *à fortiori* the more complex activities of invention and genius can be explained by association alone. It cannot explain judgment, for—to go back to Dr. Stoddart's illustration—the association between two ideas, "gold" and "yellow," is a totally different thing from the judgment : Gold (or this piece of gold) is yellow. This judgment demands the exercise of an active power. Still less can association explain the perception of the relationship between two ideas and a third reasoning. And the creations of constructive imagination would be absolutely impossible without the control of an active power, which directs, arranges, and amalgamates the various sensations, images, and ideas which, without it, could produce nothing but day-dreams.

Finally, the association of subjective impressions cannot give the idea of objective reality ; the addition or combination of sensations of round, solid, flat, cannot produce a total absolutely different, qualitatively, from the added or combined elements—namely, the idea of objective reality. Association alone would afford no means of distinguishing between reality and hallucination. For Dr. Stoddart there would seem to be no such thing as objective reality(17).

Emotion.

In his account of emotion, Dr. Stoddart tells us (1) that an emotion "consists of a number of sensations, and that these sensations are derived from the activities of certain muscles and glands"; (2) that "these sensations are the very essence of emotion." As usual, he leaves out of account the intellectual factor. No doubt the sensations of which Dr. Stoddart speaks constitute a very large element of the coarser emotions, though even in these there is a process of consciousness comprising a cognition of some object; but in the finer emotions—*e.g.*, sympathy, the aesthetic emotions—there is another very essential factor—the intellectual appreciation of relations which give a meaning to the object which arouses the emotion; the mind is affected by a complex situation which it *apprehends*. Dr. Stoddart's views as to the expression of the emotions are not very clear. On page 58 he tells us that "the various activities which give rise to the emotions are also responsible for their expression." While on the next page he writes, "It is . . . the expression which gives rise to the emotion." This is also James's view, founded on the fact that actors feel the emotions they portray. This is explained by the well-known fact that emotion and emotional expression reciprocally suggest each other. As Fechner points out, imitating the physical expression of a mental state helps us to understand it better.

The Ego.

In his treatment of this subject Dr. Stoddart confounds two essentially different things—(1) The mind's immediate perception of itself in its operations; and (2) the *feeling* of personality or of self possessed by each one of us. It is the latter which is "a recombination of abstractions from many individualities." This does not mean that we have "many selves," but that there are many states of the self—many variations in the *feeling* of personality. It is this feeling which varies at different times, different ages, and under varying circumstances. But in spite of these surface variations, we are conscious throughout of the permanence of the "ego." I am indubitably certain that I am the same person now as I was ten, twenty, or thirty years ago. I have changed, no doubt, but it is the same "I" who have changed. I could not remember the events of my boyhood if my present self were not identical with the self of that period. Dr. Stoddart argues that because I can think of my "ego" objectively, therefore "it ceases to be that *subject* of knowledge which is thinking of it," and we "must therefore come to the conclusion that the 'ego' is something unget-at-able." The true conclusion is the very opposite to this. Dr. Stoddart's own words negative his deduction. How can "I" think of "my" ego at all if in doing so it ceases to be a subject of knowledge? There is no "I" to do the thinking. It would be like a man trying to lift himself by the straps of his boots. So far from the fact that the mind apprehends itself and perceives its existence in its own acts, proving that there is no permanent ego, it is that very fact that brings out clearly the distinction between the self and its acts and between the self and its states. In any active effort of the mind, as in a difficult effort of attention, we are cognizant of the self and of the state. And the distinction becomes especially clear in our deliberate acts of self-conscious reflection.

Dr. Stoddart quotes with approval a *mot* of Lord Haldane's—the ego discloses itself as a thinker without thoughts; he himself wants us to believe in thoughts without a thinker, to look upon our ideas, feelings, efforts as, in the words of Lotze, "events floating unattached in a void."

REFERENCES.

(1.) 2nd ed., 1912.
(2.) "Primer of Psychology."
(3.) Maher. "Psychology," 6th ed., p. 42.
(4.) Mercier. "Psychologie," 9th ed., i, p. 135.
(5.) *Op. cit.* p. 9. The italics in the quotation are mine.
(6.) *Ib.*, p. 418.
(7.) Elem. Exp. in Psych.
(8.) Balmez. "Fundamental Philosophy," iv, 2.
(9.) "Metaphysics," book iii.
(10.) Stoddart. *Op. cit.*, p. 82.
(11.) *Ib.*, p. 52.
(12.) Maher. *Op. cit.*, p. 234.
(13.) "Metaphysics," b.k iii, cap. i.
(14.) *Op. cit.*, p. 53.
(15.) Preface to French trans. of Hoffding's Outlines of Psych.
(16.) "Physiological Psychology," ii, 380.
(17.) *Op. cit.*, p. 95.

SOME REMARKS ON DELINQUENCY.

By Herbert H. Woollard, M.D. B.S. (Melb.),

Medical Officer, Hospital for Insane, Kew, Victoria.

Mr. President and gentlemen,—I am moved to select this subject, though I am only too conscious of my inability to deal with it adequately, with a view to drawing attention to the problem.

In trying to make an acquaintance with the subject one is overwhelmed by the copiousness of the literature, and soon impressed by the unequal value of it. In this field every one seems to think he has something to say. As the authors are drawn to the subject by different motives, so are their conclusions equally diverse. Most works are vitiated by the desire to illustrate a thesis, few being founded on an objective study of the problem.

In the beginning the subject is hedged round by all sorts of metaphysical problems, and, though one may brush them aside as being of no consequence in a field that belongs to practical politics, it still may be prudent to briefly review them. One controversy that fills many volumes, purporting to deal with criminals, is the issue of free will *versus* determinism. This problem is as far off settlement as ever. Its discussion is no part of our object, save in so far as it is necessary to state what must be a working hypothesis. In putting forth this view it is not intended as a philosophical reading of the universe, but merely as a postulate which all working scientists must necessarily adopt.

Psychology undertakes the description of mental phenomena, their reduction to order under conceptual headings and subsequent generalizations, which if sufficiently attested by experience become ultimately scientific laws.

That is the method of psychology, and it is the same as that of the physical sciences. Further, the postulate that mental activity is the outcome of neural activity is necessary for our purpose. The pleasantries and brutalities of that toxic insanity we call drunkenness are each the product of the poisoned nerve-cells. The same mental phenomena underlie an epileptic who, in one of his whim-controlled states, scribbles meaningless words, and in another whimsical state attempts train-wrecking. To quote Dr. Healy, "The summation of irritable nerve stimuli may result in neurasthenia or murder." That the outcome may happen to have social value has nothing to do with the underlying process. Such a statement as the above invites attack ; but in defence it is urged that such a postulate is necessary, that it is a working hypothesis for scientific purposes, and not a theory of the universe ; and, further, that all the sciences make and use, as being true, such postulates, which metaphysicians are disposed to question.

Having thus disposed of caprice in the mental world, causation becomes the philosophic sequence of events, and the doctrines of the so-called faculty-psychology varnish.

The problem of nature and nurture comes in for a good deal of discussion. Unquestionably we are what we are by virtue of certain given innate capacities, and the interplay of these with environment. Nature and nurture make us, and we get involved in speculating which is the predominating factor. Attention, however, might be drawn to the words of Professor Jones, who has pointed out how these two forces are not the conflicting entities we usually picture them to be. They work hand-in-hand in ample surroundings; and just as our innate dispositions exert a selective action on an environment, so our environment develops and intensifies certain traits, and may leave others entirely latent. In this way all of us grow up more or less stunted.

The literature about and around crime treats us to long discourses on the right of the State to control certain of its members, and to inflict punishment on them. Punishment, I take it, is a thing that the physician, as physician, has nothing to do with, save in so far as a system of rewards and penalties may have some curative value.

Whatever punishment may contain of the spirit of revenge and vindictiveness is a question of ethics, and must be settled by a reference to the fundamental principles of morality. Punishment as a deterrent, either from the committal of further crimes or as a preventive from crime by persons yet unconvicted, has still to be proven. At any rate, it seems largely a matter of opinion, and the persistence of the recidivist is a stumbling-block to the acceptance of such a doctrine.

The question as to whether the State has the right to punish and penalize a certain dissenting minority is somewhat of an armchair proposition. At all events, the State does ; and it is constantly enlarging the role of interference, and stands charged now with an increasing number of parental duties. It might be useful here to review the relation of the State to crime, because a retrospect of this seems to indicate that the growing intimacy of the State with crime must go on until society undertakes the prevention and cure of its delinquent class.

The increasing functions of Government and the development of social conscience have led us far from the position in which the only duties compatible with a free State were those of policing the members and affording protection from its more lawless elements. E. H. Jones, in a recent article in the *Hibbert Journal*, entitled "Crime and Industrialism," gives an outline of the history of the attitude of the State to crime: "In the 'good old days,'" he says, "the State adopted in criminal matters a policy of *laissez-faire*. There was no check on public acts of violence. War was the natural state of things, and the only limit to it was the limit imposed by the strength of the enemy and the fear of private vengeance. The beginnings of State interference were directed not so much towards the punishment of crime as towards the reconciliation of the parties. The idea that a crime was an offence against the whole of society, as well as a private wrong, did not arise until much later. This idea came with the gradual extension of the King's peace to cover the whole kindgom, and the theory of the right of the State to interfere arose from a recognition of the fact that a man killed was a man lost to the King's Army. The next step was the introduction of the trial by combat. The State still admitted the fundamental right of the private citizen to wage war, but it literally held the ring and laid down the regulations for the fight. About the same time the State evolved the alternative method of settling disputes. Beginning with the inquest for revenue purposes, trial by jury gradually developed into a system for weighing evidence. This method was regarded with suspicion, but in the course of centuries doubts and fears were allayed, and 'trial by battel' fell into desuetude. This implies a fundamental change of attitude, where the State says 'I have nothing to do with your quarrel,' to the very positive attitude, 'The quarrel is entirely mine; you must not fight at all.'"

This evolutionary sketch of the relation of the State to crime implies the way in which this attitude must further progress. From appropriating the quarrel it must go on to consider the offender (this it has done in a degree). From dealing with the crime and only incidentally with the perpetrator, it must now regard the criminal and his biological history as being of more importance than the misdemeanour. Society must deal with the offender more and more from a paternal and physicianly point of view. This social aspect of crime must not be lost sight of—a possibility which recent developments might bring about. Crime is a social disease, and that implies dealing with it by State activity. The State acknowledges this point, and has adopted special methods for dealing with juvenile delinquents, first offenders, and made modifications in its prison system. The logical development of these things issues in treatment and reformation as being the paramount consideration.

"Who are the criminals?" is a focus where lack of definition has led to much confusion. We lazily talk about a criminal class, and imagine—such is the power of words—that we have defined and explained something. It has the further danger that it inclines us to believe that here we have a number of individuals who differ from the rest of human kind, to whom it matters little what is done. Such thinking is wrong, and it must always be remembered that when talking of a criminal class we are only branding a certain class of men who are open to the same influences and whose experiences differ in no radical way from the rest of us.

To many the name of "criminal" is attached by common usage to those who have not come within the pale of the law, and others again who have been convicted are often described officially as not being really criminals. Confusion will be lessened if the definition of Sir Bryan Donkin be accepted. The name "criminal," then, applies to all those who have broken the recognized customs and usages of the contemporary society, and in consequence have suffered certain legal enactments.

Criminology, as a study using the methods of science, is a comparatively recent venture, and seems to have been more vigorously prosecuted on the Continent than in English-speaking countries. The great pioneer has been Lombroso, and, whatever one may think of his views, high tribute must be paid him as an indefatigable investigator and a fertile source of hypotheses which compelled attention. Its short history shows a rough parallel with the history of the other sciences. Metaphysics have to be ignored, and certain postulates which each science has to assume have to be taken for granted. Then comes an era of sweeping generalizations followed by the epoch of individualistic investigation. From the large and general outlook follow the lines of social change; from the individualistic study come the means of dealing with each individual. Treatment follows diagnosis as night follows day, and is both general and local.

The theories of Lombroso and Ferri are types of many that have from time to time been enumerated. Lombroso contends that the criminal is the outcome of three factors—atavism, moral insanity, and epilepsy. The criminal anatomically shows various physical stigmata, a blunting of peripheral sensation most marked to protopathic stimuli, and psychically repeats a type that has been left behind in the evolutionary process. Epilepsy—a term which perhaps had once a definite connotation—has become so expanded by psychiatry that its limits cannot be defined. The periods of inactivity, punctuated by outbursts of energy when crime is committed, are the psychical equivalents among criminals of muscular epilepsy. Ontogenetically the criminal belongs to the condition of savagery which civilization has passed and left behind. The criminal is born, not made. It is unfortunate that this doctrine of the born criminal should have been evolved by one so eminent as Lombroso, as it strengthens that feeling of fatalism about crime which has too often hindered reform.

This startling hypothesis about the born criminal has not been confirmed by later investigators. Dr. Charles Goring, after five years of the most elaborate investigations into the life-histories of three thousand convicts, reaches the conclusion that there is no such thing as a type of human born to do evil. "There is no definite line of demarcation, no absolute difference in nature as opposed to degree between the human beings who are and those who are not criminals." If the signs of criminality—the shape of the ears, the cranial asymmetries, the easy psycho-physical reaction, the tattooing, &c.—were of any diagnostic value their importance would be great. There was, however, very little agreement between the observers as to what deviation amounted to a stigma. Some one suggested an *experimentum crucis.* At the International Prison Congress in Paris criminals and non-criminals were mixed, and their detection undertaken by the seeking-out of stigmata. The results were somewhat humorous.

Comparable to this epileptic theory of crime are such doctrines as neurasthenia and degeneration. Benedikt has enunciated the theory that neurasthenia is the basis of all crime; but such words as "neurasthenia" and "degeneration," when used so broadly without definition, convey little real meaning.

Ferri is the author of a theory of crime which is sometimes referred to as the theory of factors. It is closely related to a doctrine widely held among Socialists, and known as the doctrine of economic determinism. Ferri, like Lombroso, ransacks earth and Heaven for evidence as to the causes and condition of crime. Lombroso investigated every possible factor that could be suggested. He found evidence of criminality in the vegetable world. He tried to assess the relation to crime of the taking of snuff.

According to Ferri crime is the outcome of three factors—(1) Anthropological, (2) social, (3) physical. The anthropological include such things as sex, civic status, profession; the physical, such as race, climate, fertility of soil; the social, such as density of population, religion, manners, customs, &c. From these considerations he deduces what has been called the law of criminal saturation. "Just as in a given volume of water at a given temperature we find the solution of a fixed quantity of any chemical substance, so in a given social environment, in certain defined physical conditions of the individual, we find the commission of a fixed number of crimes." In support of this it may be mentioned that in hot countries crimes against the person are more numerous than crimes against property, when compared with cold countries. In times of prosperity crimes against property decrease while crimes against the person increase. For definite periods it can be approximately predicted how many people will commit suicide, and in what manner they will do it. However, all one can say in the presence of such a theory is that these factors are those which bring about the production of individuals whom we do not call criminals, and we no longer regard mundane events as fixed by unalterable decrees.

We have stated these two views because they are representative, and they have blazed the trail for all subsequent investigation. Their value is not to be assessed by their truth or otherwise, but in the stimulus they have provided. They arrested attention, and the attempts to prove or disprove them have resulted in modern criminology, which believes it can do valuable therapeutic work. The keynote of this modern view is expressed in the individualization of the criminal. The criminal is to be approached with the same earnestness, thoroughness, and sympathy with which we approach a case of physical disease. All the resources of medicine, anthropology, are to be invoked, and no plan of treatment or diagnosis made until after an exhaustive inquiry into all the possible factors. This method of investigation is that which is in use in the practice of medicine. We begin with the family history, and make a complete physical and mental examination of the subject. The particular crime committed is not considered as an isolated fact, but only in relation with all that we can find out about the individual. The customary medical examination involves nothing new to the physician, save that every advance in medicine may shed some light on obscure mental phenomena.

Dr. Arbuthnot Lane believes that one of the direct results of intestinal stasis, and the auto-intoxication so engendered, is a psychical deterioration which may end in crime far more often than we think. The relation of the ductless glands to the nervous system has recently been summarized in "Brain" by Dr. Elliott, and we have good reason to expect that advances in this field will enable us to understand states of mental alienation yet obscure.

The methods of psychiatric examination are perhaps not quite so familiar, and attention might be drawn to the excellent handbook on this particular subject by Dr. Franz. The psychological investigation includes all the past events that can be gleaned, and an analysis and estimate of the present mental state. In addition to the usual routine method of mental investigation, two new methods of unique value have now been formulated. The Binet method of detecting and estimating the degree of feeble-mindedness, with various modifications and experienced application, has proved invaluable from a diagnostic point of view and as a means of suggesting the line of treatment. Feeble-mindedness is not always so obvious as might be imagined. The introduction of psycho-analysis, which seems likely to revolutionize psychology, has furnished already, though not yet extensively used, valuable information concerning the causative factors of delinquency, and makes treatment more optimistic. The remarks of Dr. Healy, who has employed this method amongst juvenile delinquents, are most encouraging. In this field at least there is no need to be a thorough-going Freudian, for the repressed complex which may sublimate itself in antisocial conduct is often a psychical trauma in no way related to sexual feeling, no matter with what extended meaning the word is used.

Another discovery that has come from the realm of medical psychology needs to be emphasized here. We refer to the comparative independence that may exist between the three states of consciousness—that is, the relative separation that may be present among the intellectual, the emotional, and volitional states. The studies of Ribot excellently set forth this point, and how it may produce antisocial conduct is readily imaginable. The development of the experimental side of psychology has furnished the most delicate means of estimating the emotional reactions of the subject. It is probable that hypnotism directly plays but a small part in the production of crime, though as a means of treatment it may be of value. Hypnotism is a graphic portrayal of how suggestion, sympathy, and imitation can play on minds until we behold a panic or a crime epidemic.

There is no need to draw any comparison between the method outlined here and the method in vogue in our Courts. Stewart, of Belfast, in an article on "Recidivism," has summarized the prevailing mode, and remarks that at almost every point it is at variance with established psychological knowledge. In the manual by De Gros one will be entertained by an enumeration of the infinite factors that render unreliable the ordinary legal procedure.

Psychologists are everywhere demanding that well ascertained and established facts should be applied to recidivism. It has now been well established that two-thirds of our crime is due to mental defect; that the young offender is the one for whom most can be done; that whereas destitution, illiteracy, want of industrial skill, and so forth are of less importance in the recidivist, they are of paramount importance in the juvenile offender. The analysis of the mental defect makes clear on what lines treatment should proceed.

The following groups, which are taken from Dr. Healy's writing, show the need for careful investigation and broad outlook. Few remarks are needed about the major psychoses, but it is well worth remembering that even the coarse test for insanity as now employed had the effect in England in ten years of declaring 143 out of 441 murderers irresponsible. Further, every asylum physician can call to mind numerous cases sentenced by the Courts, and a few weeks later transferred to the hospital for insane. The role of crime is often merely an expression of the neuropathic disposition, and may exist alongside of or be interchangeable with alcoholism, insanity, and epilepsy. The protean manifestations of this neuropathic taint are now generally recognized, and to confirm this doctrine of heredity it is no longer necessary to quote such examples as the notorious Jukes family of New England.

Leaving the fields of the more or less obvious mental defect, numerous groups can be detected amongst individuals who occupy the territory between the so-called normal and abnormal. There are those who are described as mentally dull. They form a well-defined group, with mental ability about equal to that of a twelve-year-old child, but who, however, possess social and industrial capacity above the institutional level. The genesis of crime here arises from the irritations that backward children meet at school. This leads to truancy, to consorting with harmful associates, and eventually perhaps to grave social offences. The meagre earning-capacity leaves them with a vacant mind, which is the devil's playground. Obviously, suitable occupations would avoid the trouble. There is a class who are mentally dull through some physical defect, and the removal of the defect often leads to rapid amelioration and improvement of the mental capacity; these form a large class.

A further group is made up of those who are rendered obtuse and dull from some enervating habit, such as masturbation or through some toxic influence like tobacco.

Another interesting group comprises those who, though generally intelligent, have some specialized defect which handicaps their progress. An example of this class is furnished by those who could succeed if given appropriate work, but having an uncongenial occupation their incapacity produces irritations and antisocial feelings, which may end in crime.

The extensive relationship that exists between epilepsy and crime is well known. The epileptic who develops antisocial habits may become a most dangerous criminal. His actions are incalculable, and his motives are lost in the aberrations of his consciousness. Further, there is often a general physical and sexual precocity amongst these so afflicted that may be the cause of the gravest outrages; and the existence of this sexuality has a profound bearing on treatment. A large proportion of vagrants and wanderers are made up of epileptics. The minor and almost unnoticeable varieties of epilepsy seem as potent as the most flamboyant in the production of antisocial types.

The minor psychoses have a very important bearing on criminality. They are often examples of the psychological law that the three modes of consciousness may undergo a relative separation. Little more than enumeration of them is needed here. Such states as constitutional excitement fall here. In them the intellectual field is not disordered, but a general rapidity of psycho-motor reaction and restlessness characterize the disposition. The condition is a sort of mild mania, probably allied to the manic depressive psychosis, which many alienists regard as being much more common than asylum statistics show. The offence usually takes the form of self-gratification, without due regard to the proprieties.

Under this heading of minor psychoses should be added the temporary instability and the erratic conduct that mark puberty, the instability of adolescence with its vague yearnings and its life of phantasy, hysteria with its dissociation of personality, amnesic fugues, drug habits, early senile changes, and other states. These may all serve to render intelligible conduct which is abnormal.

Alcoholism and crime are twin sisters. The relation of drunkenness to antisocial conduct needs no elaboration; and Mercier has eloquently contended that drunkenness should be treated as a form of mental alienation, and not by short terms of imprisonment or repeated fines. Prolonged detention in an institution is often necessary in order to build up the resistance and establish new habit-associations in such patients.

Mention might be made of the fact that small doses of alcohol in some predisposed persons often issue in the most disastrous crimes. Vicious deeds of all sorts may occur, and subsequent intoxications are often marked by a repetition of the same offence. The disasters that often follow the exhibition of a small quantity of alcohol to the epileptic and feeble-minded are well known.

Enough has been said, I think, to show that psychiatry and its bearing on delinquency are no idle pretence, and this incomplete survey of the subject might be ended by seconding Munsterberg's plea that all the resources of modern psychology and medicine should be applied to the diagnosis and treatment of the criminal.

CARE OF THE FEEBLE-MINDED IN AUSTRALASIA.

A COMBINED meeting of the Section of Psychological Medicine and Neurology, Diseases of Children, and subsection of Medical School Inspection was held to receive and discuss a Report on the Care of the Feeble-minded in Australasia from the Committee appointed by the Australasian Medical Congress, 1911.

Proposed by Dr. C. G. GODFREY, seconded by Dr. G. BRUTON SWEET, and passed, That Dr. Chas. Savill Willis, M.B., M.R.C.S., D.P.H., Director of Medical School Inspection, Sydney, be appointed Chairman of combined meeting.

Proposed by Dr. J. SANDISON YULE, seconded by Dr. C. G. GODFREY, and passed, That the Report on the Care of the Feeble-minded in Australasia be taken as read, except the concluding remarks, which were read by Dr. J. Sandison Yule.

Report of Committee on the Feeble-minded.

The Committee appointed by the Section of Neurology and Psychiatry of the Australasian Medical Congress, 1911, at Sydney, to investigate the prevalence of feeble-mindedness in Australasia, to educate the public, and to promote a popular campaign dealing with the same, hereby begs to submit its report.

The following were appointed by the Congress as a Central Committee, with power to add to their number representatives of the various States of the Commonwealth and of the Dominion of New Zealand: Dr. Beattie Smith (Chairman), Dr. W. E. Jones, Dr. Mary Booth (Hon. Sec.), Dr. H. Sutton.

Subsequently, on the resignation of Dr. Booth, Dr. Yule took up the duties of central Hon. Secretary.

The Committee met for the first time on the 31st October, 1911, in Melbourne, and notified the following of their co-option as State representatives :—

New South Wales, Dr. A. Davidson ; Victoria, Dr. J. Sandison Yule ; South Australia, Dr. R. S. Rogers ; Queensland, Dr. Eleanor Bourne, and subsequently Dr. Harold Bourne ; Western Australia, Dr. S. H. R. Montgomery ; Tasmania, Dr. G. H. Butler, and subsequently Dr. Isabel Ormiston ; New Zealand, Dr. T. H. A. Valintine.

They then adopted the following resolutions :—

1. That the object of the campaign was to educate the public and Government in the problems of the feeble-minded, with a view to securing the provision of special schools, after-care committees, and compulsory detention of the unfit.

2. That the Central Committee should indicate the general lines on which the campaign should be conducted, and serve as a reference body.

3. That the campaign should be initiated by ascertaining the number of feeble-minded and tabulating the numbers on a uniform plan in each State.

4. That each State representative should be asked to undertake an inquiry into the number of feeble-minded in his own State, and that the records be kept according to the plan submitted.

5. That it be suggested to the local representative that the most profitable avenues to the required information could be through—(*a*) Sociological (philanthropic) agencies, (*b*) Education Departments, (*c*) the medical profession.

It was subsequently decided first to take steps by means of a general census of the school-age population to ascertain the prevalence and degree of feeble-mindedness in the various States through their representatives, and agreed that the co-operation of the various Education Departments, Churches, philanthropic institutions, medical societies, and journals should be sought.

The following memoranda and forms were approved for use throughout the inquiry (modified as required in personal details for each State :—

Memorandum A. (For every one.)

AUSTRALASIAN MEDICAL CONGRESS, 1911.—SECTION OF PSYCHOLOGICAL MEDICINE AND NEUROLOGY.

Central Committee on Care of the Feeble-minded.—Dr. Beattie Smith (Chairman); Dr. Ernest Jones ; Dr. Harvey Sutton ; Dr. Mary Booth, Hon. General Secretary, Lunacy Department, Treasury, Melbourne.

State Representatives.—New South Wales, Dr. A. Davidson ; Victoria, Dr. J. Sandison Yule ; South Australia, Dr. R. S. Rogers ; Queensland, Dr. E. Bourne ; Western Australia, Dr. S. H. R. Montgomery ; Tasmania, Dr. G. H. Butler ; New Zealand, Dr. T. H. A. Valintine.

Hon. Secretary for Victoria.—Dr. J. Sandison Yule, 151 Collins Street, Melbourne.

Education and Care of the Feeble-minded.

The Section of Psychological Medicine and Neurology at the recent Medica Congress held in Sydney in September, 1911, appointed a Committee consisting of representatives in each State of the Commonwealth and in New Zealand, with a Central Committee, to initiate a popular campaign to educate the people on the problems of the feeble-minded.

In Australia very few people outside the medical profession realize the gravity of the problem of the mentally deficient, its relation to crime, and to the multiplication of the unfit in the community. Fewer people still know anything of the modern enlightened methods, such as are found in Europe and America, of providing for the care and education of feeble-minded children. The special schools, the after-care committees, the permanent-care colonies, which make the lives of these children happy and safeguard the community, are practically unknown in Australia.

The present popular campaign is proposed with the object of educating the public on the question of the feeble-minded in the same way in which they are being educated on the question of tuberculosis.

An inquiry is being organized into the number of feeble-minded in Australia and New Zealand, and their fitness for special education, and the State representative of the Committee hopes shortly to furnish an accurate estimate for the State of Victoria.

In the educational campaign it is desired to enlist the sympathy and active co-operation of—(1) The Medical Profession; (2) State Education Departments, non-State Education Associations and Institutions; (3) Eugenic Societies; (4) Free Kindergarten Unions; (5) State Children Departments; (6) Charitable Institutions —*e.g.*, hospitals, homes; (7) Associations of Social Workers—*e.g.*, National Council of Women; (8) the Churches; (9) the Press.

Memorandum B. (For every one.)

AUSTRALASIAN MEDICAL CONGRESS, 1911.—SECTION OF PSYCHOLOGICAL MEDICINE AND NEUROLOGY.

INQUIRY INTO THE NUMBER OF FEEBLE-MINDED AND THEIR FITNESS FOR EDUCATION.

Classification.

The first broad division of children according to mental capacity is—(*a*) Supernormal or bright; (*b*) normal or average or fair; (*c*) subnormal or dull; (*d*) abnormal or feeble-minded, imbecile, idiot.

The present inquiry is concerned with divisions (*c*) and (*d*)—viz., the subnormal and abnormal.

The following definitions of mental deficiency have been adopted in order to secure uniformity of classification:—

Subnormal Children (mentally dull).—The mentally dull child may be described as having only the intelligence of a child two or more years younger. He must be differentiated from the backward child who has been retarded through some accidental circumstance in early life—*e.g.*, ill health, physical defect, bad environment—who, however, may be brought up to the normal level by suitable treatment. The mentally dull child, though educable to some extent, remains permanently retarded.

It is often difficult, without prolonged observation, to distinguish to which class a child below standard belongs.

Abnormal children are of three grades, according to the definition of the Royal Commission on the Care and Control of the Feeble-minded (Great Britain):—

1. "Feeble-minded": One who is capable of earning a living under favourable circumstances; but is incapable, from mental defect existing from birth or from an early age—(*a*) of competing on equal terms with his normal fellows; (*b*) of managing himself and his affairs with ordinary prudence.

2. The "imbecile" is one who, by reason of mental defect existing from birth or from an early age, is incapable of earning his own living, but is capable of guarding himself against physical dangers.

3. An "idiot" is one so deeply defective in mind from birth or from an early age that he is unable to guard himself against common physical dangers.

Note.—The term "feeble-minded" is for the sake of convenience here applied both to the whole group of the mentally deficient and also the subgroup, which it more specifically describes.

Memorandum C. (For all schools.)

MEMORANDUM FOR THE USE OF SCHOOLS.

In making an estimate of the mental capacity of school-children, the age of the child should be compared with the average age of the class.

A mentally dull child is one having only the intelligence of a child two or more years younger—for instance, a child of ten years in a class of which the average age is eight years may be considered mentally dull, provided no accidental retarding cause as given below is present.

The class-teacher should make a list of all children two or more years older than the average age of the class, and classify them on the schedule according to the following categories :—

1. Backward through accidental cuases in early life—*e.g.*, ill health, physical defect, bad environment, late arrival at school, employment out of school hours, irregular attendance.
2. Backward through defective intelligence, or who may be—
   (1.) Mentally dull.
   (2.) Feeble-minded.
   (3.) Imbecile.
   (4.) Idiot.

The definitions of these grades of mental deficiency are given in Memorandum B.

Note.—The majority of the older feeble-minded children—*i.e.*, of twelve, thirteen, fourteen years—are found in the II and III grades ; the younger children are with the infants and kindergarten.

Memorandum D. (For medical practitioners.)

DEAR SIR OR MADAM,— 1st June, 1912.

The Committee on the Care of the Feeble-minded desire to enlist your sympathy and co-operation in their campaign for educating the public in the problems of the feeble-minded, and the necessity for making provision on modern lines for their care and education.

The Committee wish to ascertain the number of feeble-minded in this State, and their fitness or otherwise for education in special schools. It will help them to arrive at a true estimate if you will inform them of any cases known to you of such children who do not attend school—a class of whom it is impossible to gain information in any other way.

The name is not required, but the Committee would be greatly obliged if you would fill in the other particulars on the enclosed form according to the classification in the memorandum, and return to Dr. J. Sandison Yule, 151 Collins Street, Melbourne, by 31st July, 1912.

J. SANDISON YULE,
Hon. Sec., State of Victoria.

Memorandum E. (For private schools and institutions.)

DEAR SIR OR MADAM,— 1st June, 1912.

The Committee on the Care of the Feeble-minded desire to enlist your sympathy and co-operation in their campaign for educating the public in the problems of the feeble-minded, and the necessity for making provision on modern lines for their care and education.

The Committee wish to ascertain the number of feeble-minded in this State, and their fitness or otherwise for education in special schools. It will help them to arrive at a true estimate if you will inform them of any cases attending your school.

The name is not required, but the Committee would be greatly obliged if you would fill in the other particulars on the enclosed form according to the classification in the memorandum, and return to Dr. J. Sandison Yule, 151 Collins Street, Melbourne, by 31st July, 1912.

J. SANDISON YULE,
Hon. Sec., State of Victoria.

Form 2. (For all schools.)

State of Victoria.
School :

SCHEDULE SHOWING NUMBER OF BACKWARD AND FEEBLE-MINDED CHILDREN AND THEIR FITNESS FOR EDUCATION IN SPECIAL SCHOOLS.

Initials.	Sex.	Age.	Backward from Accidental Causes.	Mentally Dull.	Feeble-minded.	Imbecile.	Idiot.	Is he or she also Epileptic, Deaf, Blind, or Paralytic? State which.
Totals								

Signed :
Address :

Form 3. (For medical practitioners.)

AUSTRALASIAN MEDICAL CONGRESS, 1911.—SECTION OF PSYCHOLOGICAL MEDICINE AND NEUROLOGY.

INQUIRY INTO THE NUMBER OF THE FEEBLE-MINDED IN , VICTORIA, AND THEIR FITNESS FOR SPECIAL EDUCATION.

Children not attending School.

(Return to be sent n to the State representative, Dr. J. Sandison Yule, 151 Collins Street, Melbourne.)

Initials.	Age.	Male or Female.	Character of Defect.	Is he or she likely to Benefit from Special Education?	Is he or she also Epileptic, Deaf, Blind, or Paralytic? State which.

Signed :
Address :
Date :

N.B.—It is requested that the defect be classified into one of the four classes herein stated—(1) Mentally dull, (2) feeble-minded, (3) imbecile, (4) idiot.

A beginning was made in May, 1912, when the forms and memoranda were sent in the State of Victoria to all medical practitioners and private schools, while the Education Department, through the courtesy of Mr. Frank Tate, the Director, distributed the same forms and memoranda to all State schools, the returns of the latter being made in duplicate, one of the copies being retained by the Department.

In July, 1912, the State of South Australia was similarly circularized, while by December, 1913, Tasmania was also completed. In New South Wales some delay was experienced owing to a previous census of their own undertaken by the Education Department, but eventually a fresh inquiry was instituted, and in that State also returns were received from medical practitioners and private and public (State) schools. This State, however, withheld its returns for reasons given later.

Queensland had an unfortunate set-back. The British Medical Association, through the kindness of its President (Dr. Butler), undertook and completed at its own expense an inquiry (as in other States) from the medical practitioners *re* feeble-mindedness in children not attending school, but the Director of Education took up an incomprehensible attitude of hostility towards any inquiry in the State schools. Consequently your Committee was obliged to fall back on the undetailed and very incomplete data furnished by the Medical Inspectors of schools in various districts.

Western Australia did nothing to promote the inquiry, nor were any replies received from letters addressed to its representative after the first few weeks.

In New Zealand your Committee were informed that the public desire for provision for the accommodation and training of feeble-minded children was in advance of the Governmental ability to supply it, and it was consequently deemed inadvisable to hold an inquiry at present, though Dr. Valintine promised to obtain approximate figures for the Committee's use. Unfortunately, these have not yet arrived.

Prior to taking the census in some States, the approval of the Roman Catholic authorities was received for the investigation in their schools, and doubtless helped to further returns. We are much indebted for this to His Grace Archbishop Carr, of Melbourne.

The Truant Inspectors were also approached through the Education Departments, where these were favourable, while in Victoria at least the kindergartens and crèches were circularized too.

With regard to the results of the census, the returns from the State schools—where access was granted to them—are incomparably the best and most complete. The return was made quasi-obligatory by the Departments, and almost all teachers replied. Although under the headings of the separate States will be found various apparent anomalies, yet the assistance afforded teachers by the memoranda supplied seems to have been, on the whole, quite adequate; although, of course, too much stress cannot be laid on the grade-classification done by non-experts.

The private-school returns were expectedly poor—want of appreciation, want of ability to investigate, and no doubt to some degree fanciful, found personal depreciation combining to render the replies few and unsatisfactory. Probably, also, a feeble-minded child whose parents were in a position to send him to a private school would be more likely to be cared for at home.

It is, however, in connection with the returns from medical practitioners *re* feeble-minded children not attending school that your Committee received its greatest disappointment. Two thousand four hundred and fifty medical men in the various States were approached by means of the special forms and memoranda, and of these only 211 replied at all—some giving details of feeble-minded children known to them, and some stating they knew none.

The causes of this disconcerting apathy are difficult to appreciate. True, many doctors with busy lodge practices are too tired to do much writing; true, also, that they have not kept, and perhaps could not keep, memoranda of all such cases that have passed through their hands; true, also, that many do not have any cases known to them of feeble-mindedness where their practice is small or highly specialized. Yet one would have hoped that there would have been a more generous recognition of the labours of your Committee and its representatives, and that at least negative replies would have been forthcoming, while the busiest friendly-society practitioner might have recollected for our use (as some did) a few of the cases with which he had come into touch.

TABLE I.

—	Number of Children examined.	Mentally Dull.		Feeble-minded.	Imbecile.	Idiot.
		Doubtful.	Undoubted.			
Victoria—						
State schools ..	175,000 [enrolment 200,000]	3,035	417*	618	116	17
Private schools ..	Cannot be accurately estimated	..	48	18	5	1
Not attending school ..			22	31	34	5
In idiot asylum ..			7	30	154	133
Totals	Perhaps 230,000 (approximately)	3,035	494	697	309	156
				1,162		
South Australia—						
State schools ..	55,000	796	859	183	24	2
Private schools ..	Cannot be accurately estimated	31	86	27	5	..
Not attending school and in institutions		..	31	98	132	79
Totals	..	827	976	308	161	81
				550		
Queensland—						
State and private schools (There are about 100,000 children of school age in Queensland)	17,333	?	?	63†	?	?
Not attending school ..	..	..	9	11	15	5
				94		
Tasmania						
State schools ..	20,000	..	539	107	9	..
Private schools ..	Cannot be accurately estimated	..	5	8	..	..
Not attending school ..		..	3	1	..	..
Totals	..	..	547	116	9	..
				125		
New South Wales—						
State schools ..	200,000	(Returns withheld; see later)				
Private schools ..	Cannot be accurately estimated	..	..	..	..	..
Not attending school ..		..	..	..	..	..
Totals	..	..	..	..	..	..
Western Australia ..	No census taken.					
New Zealand	Returns not available.					
Grand Totals for Australia (without New South Wales and Western Australia)	Perhaps 330,000 (approximately)	3,862	2,026	1,195	494	242
				1,931		

* Including those "physically unfit."

† In Queensland only classification as "mentally defective" was obtained.

It may be noted that in different States, varying estimates of the "doubtfulness" or otherwise of teachers' classification of their pupils as "mentally dull" are in evidence.

TABLE II.—RETURN OF EDUCABILITY OF CHILDREN NOT ATTENDING SCHOOL.

(All grades of mental defect included.)

	Educable.	Non-educable.
Victoria	52	40
South Australia* ..	150	190
Queensland	23	17
Tasmania	4	..
New South Wales ..	(Returns withheld ; see later.)	
Western Australia ..	..	(Did not take census.)
Totals ..	229	247

* This includes children in institutions (see South Australian Report).

The Australian number of children of school age may be set down as 850,000. Of these, approximately 300,000 were reached apart from New South Wales, and 1,200 set down as mentally defective above the degree of "dullness," or, including the minor grade (undoubted cases), 3,300.

This gives a rough total of 4 per cent. of our children definitely feeble-minded, and three times that percentage mentally dull and requiring special training. The several States vary to some extent, as will be seen later; but taking the figures all round, this is a correct interpretation of the statistics. New South Wales is excluded in this calculation, but its inclusion would make no difference in the more serious grade-percentage.

Naturally, some errors must have been made, some teachers unduly appreciating the mental status of their charges, classing really feeble-minded children as mentally dull, really imbecile children as feeble-minded. On the other hand, others seem to have been too ready to brand distaste and inaptitude for certain branches of study with the stigma of mental defect. Our Tasmanian Secretary (Dr. Isabel Ormiston) laments that some teachers in that State seem to think all their pupils feeble-minded. Whether this be due to local racial defect among the scholars or to pessimism on the part of their instructor is perhaps open to question.

On the whole, your Committee is inclined to think the State-school teacher has a very fair idea of the real mental capacity of his or her scholars.

It is to be feared that the figures taken all round err on the side of underestimating the prevalence of mental defect, especially in its graver forms. This would appear more particularly from the consideration that in the restricted practice of 211 medical men out of 2,450 circularized in the whole Commonwealth (excluding Western Australia) there are found no fewer than 251 definite defectives worse than mentally dull and not attending any schools. A simple multiplication sum will show to what conclusion this might lead us, remembering always that in the 211 are enumerated negative as well as positive returns, and that the non-repliers include many doctors privately known to members of the Committee as specially likely to meet with this type of case.

The census has thus revealed a sufficiently grave prevalence of hereditary mental defect in our community, calling for legislative action and provision.

The remedies for this state of things must come through State channels, the Commonwealth having no jurisdiction ; hence the question of future legislation has been left in the hands largely of the State Committees which each State representative had the power to form. It was deemed wise to appoint these after the taking of the census, that they might have some basis on which to work. What has been done in various States, so far as it is known to the Committee, will be detailed under the heading of each State subsequently.

Although the legislation must be through the States, it is nevertheless desirable—indeed, imperative—that some degree of uniformity in legislation and provision should subsist, since no State will desire to attract the undesirables of its neighbours by making better provision.

(States in order in which census was taken.)

VICTORIA.

The returns for this State were of a very complete type from the State schools, of a very incomplete type from private schools and medical practitioners.

Out of a school-age population of about 300,000, 175,000 were reached through State schools, while the number covered by the private schools and medical practitioners can hardly be estimated.

The following tables show the results obtained as classified by Mr. G. Tregarthen, of the Victorian Government Statist's Department, a member of the Victorian State Committee appointed by your Central Committee to deal more particularly with the question in this State, and to move Government and public opinion as might seem wise. The other members of this Committee were Drs. C. G. Godfrey, A. J. Wood, and Professor Laurie, together with the members of the Central Committee.

State Schools.

—		Age.														
		5 and under.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	Total
Mentally dull—																
Doubtful ..	M.	3	26	52	137	192	229	241	271	306	211	53	16	2	..	1,739
	F.	5	19	57	90	108	159	207	217	240	144	41	8	1	..	1,296
Undoubted ..	M.	..	2	5	22	7	29	15	25	29	11	2	2	..	..	149
	F.	..	1	5	11	9	10	15	13	25	8	3	1	..	..	101
Physically unfit ..	M.	..	1	10	6	10	12	17	11	11	11	6	2	1	..	98
	F.	..	1	7	11	5	9	9	4	13	8	1	1	..	..	69
Totals ..	M.	3	29	67	165	209	270	273	307	346	233	61	20	3	..	1,986
	F.	5	21	69	112	122	178	231	234	278	160	45	10	1	..	1,466
Feeble-minded—																
From accident ..	M.	..	1	..	..	..	1	1	1	1	1	..	..	..	..	6
	F.	..	..	..	..	1	1	..	..	..	..	..	..	..	..	2
Hereditary taint or physical defect	M.	1	5	5	9	7	4	12	11	10	5	2	1	2	2	76
	F.	1	1	2	4	10	9	9	6	9	5	1	..	..	..	57
Not stated ..	M.	3	6	30	27	33	30	32	50	41	23	7	2	..	1	285
	F.	1	8	12	18	16	26	17	36	30	20	3	2	3	..	192
Totals ..	M.	4	12	35	36	49	35	45	62	52	29	9	3	2	3	367
	F.	2	9	14	22	27	36	26	42	39	25	4	2	3	..	251
Imbecile	M.	..	4	4	8	11	16	6	8	9	7	2	1	1	..	77
	F.	1	..	1	8	9	5	4	2	2	1	4	2	..	..	39
Idiot	M.	..	..	..	2	2	1	3	1	2	..	1	..	..	..	12
	F.	..	..	..	1	1	1	..	1	..	..	..	1	..	..	5
Epileptic (also include above)		..	..	..	..	..	..	..	..	..	..	..	..	..	..	113

Private Schools.

—		Age.														
		5 and under.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	Total
Mentally dull* ..	M.	1	2	1	2	1	2	2	2	4	..	..	..	..	..	17
	F.	5	2	1	..	2	4	1	4	6	2	3	1	..	..	31
Feeble-minded— Physically unfit ..	M.	..	..	..	..	..	..	1	1	1	1	..	..	..	..	4
	F.	..	..	1	1	..	..	..	2	1	..	..	..	..	..	5
Not stated ..	M.	..	2	1	1	..	..	..	..	..	..	..	..	..	..	4
	F.	2	..	..	..	..	1	..	..	..	1	..	..	1	..	5
Totals ..	M.	..	2	1	1	..	..	1	1	1	1	..	..	..	..	8
	F.	2	..	1	1	..	1	..	2	1	1	..	..	1	..	10
Imbecile	M.	..	..	..	1	..	..	..	..	..	..	1	..	..	..	2
	F.	..	..	..	1	..	..	1	..	..	1	..	..	..	..	3
Idiot	M.	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
	F.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epileptic (also included under other heads)		..	..	..	..	..	..	..	..	..	..	..	..	..	..	2

* One female at ten and one female at thirteen physically unfit.

In the Idiot Asylum, Kew.

Class.	7 Years and under.	7 to 14.	14 to 21.	Over 21 Years.	Total.
(*a.*) Mentally dull	3	3	1	..	7
(*b.*) Feeble-minded	2	6	14	8	30
Total	5	9	15	8	37
(*c.*) Imbecile	8	18	39	89	154
(*d.*) Idiot	12	25	40	56	133
Total	20	43	79	143	287
Grand total	..	..	..	..	324

Children not attending School.

—		Age.																	
		5 and under.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	Over 20.	Total.
Mentally dull— Educable	M.	1	1	..	1	..	4	..	..	..	2	..	..	..	..	..	..	..	9
	F.	..	1	..	..	1	1	1	..	..	..	..	1	..	..	..	..	..	5
Useless	M.	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	1	3
	F.	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	1	2	5
Feeble-minded— Educable	M.	4	1	..	..	..	2	1	..	..	2	..	1	1	1	..	..	..	13
	F.	2	..	..	..	1	1	..	1	..	1	..	..	..	..	..	..	3	9
Useless	M.	..	..	..	1	..	..	..	..	..	1	1	1	..	1	..	..	2	7
	F.	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	2
Imbecile— Educable	M.	4	..	..	..	..	..	1	..	1	1	..	..	1	..	1	..	..	9
	F.	4	..	..	..	..	..	..	..	..	1	1	..	..	1	..	..	..	7
Useless	M.	1	..	..	1	..	..	..	1	..	..	..	1	1	..	..	1	2	9
	F.	3	..	..	..	..	2	..	..	..	..	..	1	..	..	..	..	..	9
Idiot	M.	1	..	..	..	..	..	1	..	..	..	..	..	..	1	..	1	..	4
	F.	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Epileptics (also included under other heads)		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17

The classification into age groups may facilitate judgment on various points.

To arouse medical interest, a special meeting of the Victorian Branch of the British Medical Association was held to deal with the subject of feeble-mindedness, and the questions raised were ably debated. Several articles, reports, and letters also appeared in the *Australian Medical Journal*, as well as in the *Age* newspaper particularly, while addresses have been given by Dr. W. E. Jones, Dr. Harvey Sutton, and Dr. W. A. Wood on the subject before parents' educational unions and similar bodies.

A deputation comprising the Victorian Committee and other prominent medical men also waited upon the Acting-Premier of Victoria—the Hon. John Murray—and received a sympathetic hearing. Mr. Murray subsequently authorized Dr. W. E. Jones to draw up a Bill to deal with the whole problem in Victoria.

Meanwhile the Victorian Education Department has begun a day school in one of the suburbs for the special training of mentally defective children; it is at present attended by about seventy children, but of course only provides for a very small proportion of the total number even in the metropolis, some being unfit to travel to it and others not being allowed to do so by their parents. It really covers only children in the immediate neighbourhood. There are approximately three hundred to five hundred feeble-minded children attending State schools in Melbourne.

SOUTH AUSTRALIA.

South Australia was the next State to have the census taken, the identical forms (modified for South Australian use) being printed in Melbourne and supplied to Dr. Rogers, the State Secretary of your Committee. We desire specially to congratulate Dr. Rogers and his Committee on the response elicited and the trouble he took. In South Australia the most complete results of any State were obtained. The South Australian State Committee consisted of the following gentlemen: Sir Chas. Goode (President of Minda), Chairman; (the late) Mr. A. Williams (Director of Education); Mr. T. H. Atkinson (Chairman Destitute Board); Mr. T. Rhodes (President State Children's Council); Dr. R. Pulleine (Hon. Sec. Royal Society of South Australia); Dr. M. H. Downey (staff, Parkside Asylum); Dr. R. S. Rogers (State representative). The last three gentlemen constituted a sub-committee to secure statistical data.

The results of the census were as follows: From 800 public (State) schools, representing 55,000 children, the response was unanimous; from 189 private schools, 158 replied; from 228 medical practitioners, 112 replied; from six institutions, returns are complete. As regards all classes but the first, this is much better than anywhere else in the Commonwealth.

The South Australian Committee embodied their conclusions in an excellent report which may be perused in the *Australian Medical Journal* of 19th April, 1913. Some of its observations and tables are here quoted, the rest omitted for the sake of compression.

Many of the returns from schools were accompanied by explanatory references, and the sub-committee used its discretion in classifying such results.

It is observed that 1,655 children were classed as mentally dull, but in a large proportion of cases the dullness was apparent rather than real, being often due, in the judgment of the teacher, to some such accidental cause as "bad environment," "distance from school," "late entry at school," "irregular attendance," "illness," and so on. These appear as "doubtful" in the table. This may also be noted in the Victorian tables.

A very large number of the feeble-minded and mentally dull children in some districts were reported as being interrelated, strongly suggesting the well-known hereditary character of feeble-mindedness. In other instances details such as "parents cousins," "parents strange," "father insane," "mother weak-minded," &c., were voluntarily supplied by the teachers. In one district one-eighth of his scholars were reported by a teacher as "mentally defective."

The following are the tabulated results :—

State Schools.

—	Sex.	Age.															
		5 and under.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	Age not stated.	Total.
Mentally dull— 1. Undoubted ..	M.	3	17	43	59	59	74	62	74	42	19	10	2	..	..	4	468
	F.	3	11	22	38	38	46	65	70	40	22	4	1	..	1	6	367
	Both	6	28	65	97	97	120	127	144	82	41	14	3	..	1	10	835
2. Doubtful ..	M.	..	2	18	27	51	59	87	82	61	37	14	1	..	..	3	442
	F.	..	3	9	26	34	67	54	63	44	25	20	2	3	2	2	354
	Both	..	5	27	53	85	126	141	145	105	62	34	3	3	2	5	796
3. Practically unfit	M.	..	..	..	..	3	3	1	2	2	..	1	1	..	..	1	14
	F.	...	..	..	2	2	..	3	1	1	..	1	..	..	..	..	10
	Both	..	..	..	2	5	3	4	3	3	..	2	1	..	..	1	24
Total ..	M.	3	19	61	86	113	136	150	158	105	56	25	4	..	..	8	924
	F.	3	14	31	66	74	113	122	134	85	47	25	3	3	3	8	731
Feeble-minded— 1. From accident	M.	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	2
	F.	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1
	Both	..	..	..	1	..	1	..	..	1	..	..	..	..	..	..	3
2. Hereditary taint or physical defect	M.	..	1	..	4	1	1	2	1	1	..	..	..	..	..	..	11
	F.	..	2	1	4	2	1	3	..	2	..	..	..	..	..	..	15
	Both	..	3	1	8	3	2	5	1	3	..	..	..	..	..	..	26
3. Not stated ..	M.	..	4	12	8	17	12	15	15	9	4	..	1	..	1	4	102
	F.	..	2	6	6	6	5	5	8	4	5	..	1	..	..	4	52
	Both	..	6	18	14	23	17	20	23	13	9	..	2	..	1	8	154
Total ..	M.	..	5	12	12	18	14	17	16	11	4	..	1	..	1	4	115
	F.	..	4	7	11	8	6	8	8	6	5	..	1	..	..	4	68
Imbecile	M.	..	1	2	2	1	1	3	1	2	3	..	..	..	..	..	16
	F.	..	..	..	1	..	1	..	2	1	1	1	1	..	..	..	8
	Both	..	1	2	3	1	2	3	3	3	4	1	1	..	..	..	24
Idiot	M.	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	2
	F.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Both	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	2
Epileptic (also included above)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11

Private Schools.

Nature of Defect.	Sex.	Age.															
		5 and under.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	Over 18.	Total.
Mentally dull*— 1. Doubtful ..	M.	..	..	..	1	..	2	1	3	3	1	2	2	..	..	..	15
	F.	..	..	..	1	3	..	..	..	4	2	3	2	..	1	..	16
	Both	..	..	..	2	3	2	1	3	7	3	5	4	..	1	..	31
2. Undoubted ..	M.	..	..	3	2	4	5	6	6	2	6	3	3	3	..	..	43
	F.	..	1	..	1	4	4	7	4	4	5	4	3	..	1	3	41
	Both	..	1	3	3	8	9	13	10	6	11	7	6	3	1	3	84
Feeble-minded† ..	M.	1	..	..	1	1	..	3	..	3	1	2	3	2	..	..	17
	F.	..	..	..	3	..	..	..	1	..	..	2	..	1	1	2	10
	Both	1	..	..	4	1	..	3	1	3	1	4	3	3	1	2	27
Imbecile	M.	..	..	..	..	..	..	..	..	1	1	..	..	..	..	1	3
	F.	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	2
	Both	..	..	..	..	..	..	..	..	2	2	..	..	..	..	1	5
Idiots‡	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Epileptic (also included above)	Both	..	..	..	2	..	..	1	..	..	2	1	1	..	..	..	7

* 1 female at nine and 1 female at 10 (not included above), were returned as "physically unfit."
† Cause of mental defect not stated. ‡ No returns.

Medical Practitioners and Institutions.

Nature of Defect.	Sex.	Age.																	
		5 and under.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	Over 20.	Total.
Mentally dull— 1. Educable ..	M.	..	..	..	1	1	1	..	1	2	..	1	..	..	..	..	1	..	8
	F.	..	..	1	1	1	..	1	2	1	2	1	..	1	..	1	1	..	13
	Both	..	..	1	2	2	1	1	3	3	2	2	..	1	..	1	2	..	21
2. Not educable ..	M.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	3	6
	F.	..	..	..	..	..	..	..	..	..	..	..	..	.	1	..	1	2	4
	Both	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	4	5	10
Total ..	Both	..	..	1	2	2	1	1	3	3	2	2	..	1	1	1	6	5	31
Feeble-minded— 1. Educable ..	M.	4	1	..	6	1	..	3	4	..	..	1	..	2	..	1	10	..	33
	F.	1	2	1	2	..	1	1	2	2	1	2	1	3	..	3	7	..	29
	Both	5	3	1	8	1	1	4	6	2	1	3	1	5	..	4	17	..	62
2. Not educable ..	M.	..	2	..	..	..	..	1	..	..	..	..	..	1	..	..	7	9	20
	F.	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	14	16
	Both	..	2	..	..	..	..	1	..	..	..	..	..	1	1	..	8	23	36
Total ..	..	5	5	1	8	1	1	5	6	2	1	3	1	6	1	4	25	23	98
Imbecile— 1. Educable ..	M.	9	2	1	2	2	2	..	2	2	2	3	..	1	3	1	7	..	39
	F.	7	..	..	3	1	1	..	1	..	1	1	..	..	..	..	13	..	28
	Both	16	2	1	5	3	3	..	3	2	3	4	..	1	3	1	20	..	67
2. Not educable ..	M.	2	..	..	..	..	2	3	..	..	..	..	3	1	..	2	12	15	40
	F.	1	..	..	..	1	..	..	1	2	1	..	1	..	..	1	12	5	25
	Both	3	..	..	..	1	2	3	1	2	1	..	4	1	..	3	24	20	65
Total ..	..	19	2	1	5	4	5	3	4	4	4	4	4	2	3	4	44	20	132
Idiot	M.	3	1	..	4	..	3	..	..	2	1	..	1	2	1	..	7	9	34
	F.	6	..	1	..	3	2	..	1	1	1	1	1	1	3	1	10	13	45
	Both	9	1	1	4	3	5	..	1	3	2	1	2	3	4	1	17	22	79
Epileptic (also included above)	Both	2	..	3	2	1	6	1	3	2	1	1	1	2	4	2	17	15	63
Paralytic (also included above)	Both	3	1	1	..	2	3	1	1	..	..	..	1	1	2	1	7	9	33

In Institutions.

Institution.*	Class of Defect.	Age. 7 Years and under.	7 to 14.	14 to 21.	Over 21 Years.	Total.
Parkside Asylum ..	Feeble-minded	..	..	4	7	11
	Imbecile ..	..	1	9	24	34
	Idiot ..	1	6	10	17	34
Minda	Feeble-minded	..	6	6	2	14
	Imbecile ..	1	10	12	16	39
	Idiot ..	3	7	11	4	25
Destitute Asylum ..	Mentally dull ..	..	..	..	5	5
	Feeble-minded	..	..	..	15	15
	Imbecile ..	..	..	..	6	6
State Children's Department†	Mentally dull ..	..	5	10	..	15
	Feeble-minded	1	5	9	..	15
Total ..	..	6	40	71	96	213

* In addition to the above, the South Australian Institution for the Blind, Deaf, and Dumb at Brighton, and Escourt House at Semaphore, shelter a few "defectives"—in all, thirteen—bringing total up to 226 (or, omitting the "mentally dull, 206).

† A number of "mental defectives" under control of this Department are placed in other institutions. Their returns appear under the proper headings.

Age—Distribution of Mental Defectives.

Returns from	Mental Defect.	Age. 5 and under.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	Over 18.	Age not stated	Total.
1. State schools	Mentally dull*	6	28	65	99	102	123	131	147	85	41	16	4	..	1	..	11	859
	Feeble-minded	..	9	19	23	26	20	25	24	17	9	..	2	..	..	..	8	183
	Imbecile ..	..	1	2	3	1	2	3	3	3	4	1	1	..	..	..	..	24
	Idiot ..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	2
2. Private schools	Mentally dull*	..	1	3	3	9	10	13	10	6	11	7	6	3	1	3	..	86
	Feeble-minded	1	..	..	4	1	..	3	1	3	1	4	3	3	1	2	..	27
	Imbecile ..	..	..	..	..	..	..	..	..	2	2	..	..	..	..	1	..	5
3. Doctors and institutions	Mentally dull	..	..	1	2	2	1	1	3	3	2	2	..	1	1	12	..	31
	Feeble-minded	5	5	1	8	1	1	5	6	2	1	3	1	6	1	52	..	98
	Imbecile ..	19	2	1	5	4	5	3	4	4	4	4	4	2	3	68	..	132
	Idiot ..	9	1	1	4	3	5	..	1	3	2	1	2	3	4	40	..	79
Total ..	..	40	47	93	151	150	167	184	200	128	77	38	23	18	13	178	19	1,526

* The "doubtfully dull" are not included in this table. They number in all, from State and private schools, 827 children.

The table shows that there are in the State—Mentally dull, 976; feeble-minded, 308; imbecile, 161; idiot, 81: total, 1,526.

About two-thirds of the 340 mental defectives reported from medical practitioners and institutions were deemed educable, and therefore capable of benefiting by special training, some of the rest being classed "non-educable" because too old.

It will be noted that sixty-three mental defectives were suffering from epilepsy, thirty-three from paralysis, and some from both.

Two hundred and twenty-six mental defectives are cared for in the special institutions already provided in South Australia, including Parkside Asylum, Minda Home, Destitute Asylum, State Children's Department, Escourt House, and the South Australian Institution for the Blind, Deaf, and Dumb. Minda is about to erect a new wing, which will accommodate forty more.

Taking all classes together, there are shown at least 550 defectives of a worse grade than mentally dull, or 1,526 if the undoubted members of the latter group are admitted. These figures must be too small, considering that half the doctors and many private schools made no return. Of the 550 feeble-minded and worse, only 206 are more or less under proper care in institutions. Many of the others are fast breeding their like, one case being known to the Committee of a woman returning eight times to an institution to give birth to illegitimate children, many of whom will be feeble-minded, and most of them capable of transmitting the defect.

TASMANIA.

In this State the census was made through the courtesy of the Department of Public Instruction in circularizing the State schools, and the assiduity and kindness of Dr. Isabel Ormiston in supervising the rest and collating the results of all. Dr. Ormiston took up this work on the Hon. Dr. Butler's finding it impossible for him to act as the Committee's Tasmanian representative.

The results were as follows: State schools—Of 380, practically all replied; private schools and convents—of 140, eighteen replied; medical practitioners—of 110, four replied.

——		Sex.	State Schools.	Private Schools and Convents.	Medical Practitioners.
Backward from accidental causes		M.	683	1	..
		F.	519	5	..
Mentally dull		M.	312	..	2
		F.	227	5	1
Feeble-minded		M.	66	6	..
		F.	41	2	1
Imbecile		M.	6	..	..
		F.	3	..	..
Idiot		M.	..	..	..
		F.	..	..	..
Epileptic	Also include above	M.	12	..	..
		F.	14	1	..
Deaf		M.	6	..	..
		F.	9	..	..
Paralytic		M.	5	..	..
		F.	1	..	..

Dr. Ormiston considers that the teachers in the State schools tend to overestimate the number of mentally dull and backward children. In some cases she laments that the teacher seemed to consider all the scholars mentally defective! Mental lethargy at least seems widespread when the stupendous aggregate of four medical men deemed it worth while making returns on a matter of national urgency to their own Congress.

QUEENSLAND.

In Queensland Dr. Eleanor Bourne was the State representative, but found it impossible to give the matter sufficient time. She has, however, from time to time loyally endeavoured to rouse the unwilling Queensland authorities to action. Dr. Harold Bourne has recently been acting as State representative in her place.

The local branch of the British Medical Association, through its energetic President (Dr. Butler), kindly undertook at its own expense the investigation through medical men of the children not attending school. The results are subjoined.

The Director of Education in Queensland has, unfortunately, persistently refused to take a census in the State schools ; for what reason is a mystery. Your Committee used all the persuasions it could command, and personal interviews were held with the Director by Dr. Bourne and others interested, but with no result. In the circumstances, Dr. Bourne did the best he could in procuring a report from the District Medical Inspectors of Schools in all the localities he could manage. These only cover a small number of children comparatively, and are unclassified, but are here submitted as better than nothing :—

Queensland Primary State and Private Schools.

Inspector.	District.	Number examined.	Defectives.	Percentage.
Dr. Buchanan . .	Brisbane	2,019	18	0·89
Dr. Croll . .	,, ...	3,038	10	0·33
Dr. Sweet . .	Ipswich (South Queensland)	1,725	5	0·29
Dr. Bourne . .	Brisbane	3,068	7	0·23
,, . .	West Queensland	1,199	4	0·33
,, . .	North Queensland . .	1,850	5	0·27
,, . .	Darling Downs	2,739	6	0·22
,, . .	Gympie, &c.	1,695	8	0·47
Dr. Nesbit . .	Townsville	850	18	2·10
Total . .	. .	18,180	81	0·44

This return indicates that among 18,180 children eighty-one are defective. Therefore among the total number of school-children in Queensland 445 are probably defective.

Children not attending School.

——	Mentally Dull.	Feeble-minded.	Imbecile.	Idiot.	Total.
Total number	9	11	15	5	40
Education—					
Likely to improve	7	7	9	. .	23
Not likely to improve . .	2	4	6	5	17
Age—					
Over 12 years	6	4	8	2	20
Under 12 years	3	7	7	3	20
Sex—					
Male	5	7	12	4	28
Female	4	4	3	1	12
Epileptic — Also include above	1	1	2	1	5
Deaf	1	. .	. .	. .	1
Paralytic	1	3	1	2	7

Note by Queensland Committee.—These returns come from twenty-two answers received out of 360 circulars, so that there are possibly sixteen times as many feeble-minded not attending school as these returns indicate—giving a possible number of 640 feeble-minded not attending school. Of these, half are over twelve years, which leaves 320 under twelve years. Also, the returns indicate that 57 per cent. are likely to improve with treatment.

Note by Central Committee.—The Queensland Committee thought the figures from Townsville so different from the rest as to be better omitted ; the Central Committee, however, deemed it wiser to include all.

NEW SOUTH WALES.

The census here was taken through the State representative, Dr. A. Davidson. For some time it was doubtful whether uniform investigations could be attained in this State, as the public (State) schools had recently held an inquiry of their own on other forms. However, by the efforts of Dr. Davidson, the census was taken again on the forms used throughout Australia by your Committee. As elsewhere, this was effected through the Education Department.

The private schools and medical practitioners were approached in the same way, and the results exhibited the same ungratifying lack of interest on the part of our profession as elsewhere.

After the census was taken it was carefully worked out, as far as the State or public schools were concerned, by the Education Department Statistical Branch. The results were shown to the Secretary of your Committee, but the New South Wales State Committee decided not to publish them, as it was thought they would be misleading. This opinion was based on the following grounds :—

(1.) The number of " mentally dull " children in the public-school returns was abnormally large as compared with those in other States of the Commonwealth, and was presumed to be exaggerated by the teachers owing to their minds being perplexed by recent State inquiries relative to " retardation."

(2.) When the school classes in which these alleged mentally dull and feeble-minded children appeared were scrutinized, it was found that in many instances a child was marked " mentally dull " or even " feeble-minded " when he was actually in a school class whose average age exceeded his. This was thought to vitiate completely the results.

In regard to these objections, your Committee think that while some grave error must have obtained in this New South Wales school census, yet it would have been preferable (especially in the interests of uniformity throughout Australia) to publish the figures and subjoin the comments they decidedly would have needed.

The number of feeble-minded returned was roughly proportionate to those in other States of the Commonwealth ; it was only the minor grade which seemed exaggerated.

Certainly no one will suppose that the school-children of New South Wales really exhibit a greater proportion of mental dullness than the children of any other Australian State ; yet it can hardly be maintained that the New South Wales teachers are more lacking in intelligence either ; so that a dilemma seems inevitable. Very possibly the " retardation " inquiries are responsible, as the State Committee suggest, but, on the other hand, the New South Wales teachers may be right and the teachers in other States wrong.

The New South Wales Committee are further of opinion that all State-school teachers tend to exaggerate greatly any mental defect in their pupils. This view is held by some authorities, but is directly negatived by tests carried out in other States in connection with this census. Thus, in Victoria Dr. H. Sutton investigated several schools subsequent to the census in order to check the figures. He found in practically every instance that the teachers had *understated* the prevalence of intellectual defect, often by 50 per cent.

With regard to the so-called feeble-minded and mentally dull children found in New South Wales to be in a school class superior to their age, it is impossible to give a complete explanation, but three considerations must be weighed in the mind :—

(1.) The school-teacher must have had some reason for his written official statement to his Department.

(2.) A marked degree of capacity for one subject—*e.g.*, arithmetic—may exist in a child yet definitely feeble-minded by any reasonable test, and this capacity may have secured him his class position.

(3.) Even several errors can hardly be regarded as completely invalidating a large return involving thousands of children.

Your Committee trusts that these comments will not be deemed a breach of confidence in a matter of such importance to the community, especially in view of the breach in uniformity of statistics occasioned by the absence of returns from the most populous Australian State.

WESTERN AUSTRALIA.

Western Australia has done nothing.

NEW ZEALAND.

New Zealand has been making investigations, but the results are not to hand.

FINANCIAL.

BALANCE-SHEET.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
Grant from Congress ..	15	0	0	King and Son (England) for printing and sending copies of British Report on Feeble-minded ..	1	7	0
				Shipping Newspapers (Limited),* for printing additional circulars for Victoria and circulars for Tasmania and Queensland	5	15	6
				Postage on circulars to various States	1	1	7
				Expenses of Secretaries, Dr. Yule and Dr. Booth, including stationery, postage, carriers' fees, typing, report, &c.	6	15	11
	£15	0	0		£15	0	0

A sum of £15 was granted from Congress funds for the investigation. In the individual States other sums were given by the Government (£10 in the case of Victoria), while the Government Departments of Education undertook the cost of sending the forms to their teachers, but your Committee bore the expense of printing.

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* The cost of printing the greater part of the memoranda and forms for Victoria and sending them out was met by a Victorian Government grant of £10, for which we express thanks to the Acting-Premier (Hon. John Murray).

CONCLUDING REMARKS.

The percentage of mentally defective children is much the same as that disclosed by English statistics. It must be noted that the inclusion in some States of adult defectives of this type makes a slight difference in estimating the totals, but as this only occurs in the comparatively very few lists received from medical practitioners, it by no means even begins to offset the undisclosed child cases known to doctors.

Your Committee considered it wiser to investigate before rousing public interest on the large scale in favour of legislation, but the time is now ripe to do so.

It is unnecessary in a report of this kind to insist on the proved hereditary character of feeble-mindedness, but it may well be recalled here as an ascertained fact confirmed by numerous far-reaching inquiries, particularly in America. Similarly, the exceptional fertility of the feeble-minded, whether due to lack of self-control or other causes, may be taken as proved. The fact may likewise be noted that feeble-minded children are far happier in institutions, except in the most favourable circumstances where the parents can and will provide adequate care and supervision. It has been demonstrated that such colonies are feasible and satisfactory by American and English experience, even when detention is voluntary ; but to avert the very serious evil of propagation of this undesirable species, as well as to prevent the disastrous consequences to the feeble-minded themselves of untrammelled and incompetent liberty, some legislation enabling institutions under due legal safeguards to detain compulsorily is urgently required. The want of this has been the source of much disappointment in the past, where prosperous pupils under tutelage up to the age of eighteen have gone free through some whim of their own or their parents, as they are legally entitled to do at that age, and have ruined their lives by falling into crime and vice. The sexual instinct in particular is apt to be utterly uncontrolled in feeble-minded persons, and the results need no reiteration. Undoubtedly, a very large proportion of our habitual criminals, drunkards, prostitutes, and wastrels are feeble-minded; and money spent in preventing by detention, instead of futilely endeavouring to cure by imprisonment and fine this mass of vice and squalor, would be more happily employed, and would go farther.

Your Committee regards it as unfortunate that in the public and, to some extent, in the professional eye, the life-care and control of defectives should be mixed up with the question of sterilization. This, though possibly permissible in a few exceptional cases, and nominally legalized in certain American States, your Committee regards as for the most part wholly unnecessary and undesirable. Control is usually quite sufficient safeguard, alike to the feeble-minded and to the community. Especially must it be remembered that this remedy of sterilization is and must always be repugnant to a very large section of the public as well as to parents, and it would be in the last degree disastrous if it were generally believed that the solution of the problem of dealing with the feeble-minded involved this. In addition, it will be recognized that there is a moral danger in the presence among the general community of a number of known steriles.

It may be noted that in this census no recognition or enumeration of "moral imbeciles" has been attempted. This is not because your Committee do not recognize such as a very important and definite type, but because from the nature of the census (mainly through school-teachers) it was thought impracticable to give sufficient instructions by means of memoranda to enable this class to be identified. Undoubtedly, if legislation is attained, this subject will demand earnest attention.

Finally, your Committee is of opinion that the following is in general terms the direction in which legislation to provide for the feeble-minded should take :—

(1.) Day schools in large centres to train all children reasonably suspected of mental defect. These will eliminate children wrongly classed as such, and qualifiy them for further education through the ordinary channels. The identification of the rest they would confirm.

(2.) Residential schools for children of the same doubtful class from scattered districts and for children definitely judged to be mentally defective. Classes of the type found most successful in other lands will be here available for the purpose of completing the children's training—both manual and scholastic, so far as the latter is found to be desirable and useful. In this class may also be mentioned the small paying schools. It will be necessary to provide for the mentally defective children of the more well-to-do parents when the latter are unable to provide satisfactory care and control at home. These institutions could be worked either separately or in conjunction with the non-paying school.

(3.) In connection with the residential schools, to some extent, and probably also by preference in separate country localities, residential colonies with separation of the sexes for the permanent care of the feeble-minded on attaining the adult age, when not of so low a grade as to call for confinement in such institutions as idiot asyluns.

The detention of mental defectives in these colonies will, of course, presuppose adequate legal safeguards to avoid any possibility of error; this could be further provided against by periodical inspection.

Moral defectives might be dealt with to a large extent by these institutions, or might require some special provision.

Such colonies exist in England and America, but are handicapped by the want of legal power to detain. This should certainly be granted, as otherwise the worst cases from the point of view of the community would have to be allowed to roam at large.

The consensus of opinion of all who have seen the colonies in operation is that the feeble-minded are far happier as well as safer in them than when left to the mercy of ignorant parents or a world which has too much to do to make allowances for them or prevent their misconduct or disaster. The expense of instituting the colonies would undoubtedly be large, yet truly economical when the present expenditure on misdealing with the feeble-minded in gaols and charitable institutions is weighed in the balance.

By such means alone can the State hope to prevent the feeble-minded forming the large proportion they do of our habitual criminals, drunkards, prostitutes, and wastrels, and thus alone with propriety can they be prevented from propagating their undesirable type in the make-up of future generations.

DISCUSSION.

Dr. W. F. Litchfield (Sydney) said,—I propose to deal with the subject from the clinical point of view. Clinically the subject may be classified as follows: (1) Mongolism; (2) microcephaly; (3) hydrocephaly; (4) mental defect in Little's disease; (5) amaurotic family idiocy; (6) cretinism; (7) mental defect following injury; (8) mental defect following disease such as encephalitis and meningitis; (9) mental defect due to syphilis, chiefly juvenile general paralysis; (10) amentia, or congenital mental defect with no distinguishing characters. Of these, Mongolism, microcephaly, one form of hydrocephaly, some forms of Little's disease, and amentia are congenital diseases due to little-understood anomalies of growth; the others are acquired on secondary conditions. While it is important to distinguish these classes one from the other, only one—namely, amentia—has much public or social importance. The members of the others are limited in number, and rarely reach adult life.

The Mongol is easily recognized by his flat nose, slanting eyes, flat occiput, slack muscles, and placid temper. They are not uncommon, and usually appear late in a large family. They are usually carried off by some intercurrent complaint, and rarely attain to adult life. Microcephaly is not very common. I have not seen more than six well-marked examples. I once saw two microcephalic sisters in an otherwise normal family. Their ages were twenty-one and twenty-six years respectively, and the intelligence in each case was about equal to that of a child aged two years. Hydrocephalus may be congenital or secondary to syphilis and meningitis. High intelligence is possible with hydrocephalus, but as a rule the victims are imbecilic. I saw one case of moderate hydrocephalus in a child cured with mercury. Little's disease, or congenital spastic deplegia, is fairly common. It may be congenital and associated with sclerosis of the brain, or porencephaly, or it may be acquired at birth, and due to haemorrhage. The mental defect varies. I have seen two cases where the arms, legs, jaw, and articulation were involved, and yet the intellect was apparently normal. Cretins usually respond well to treatment with thyroid extract, but to get the best results they should be caught young. Parents sometimes neglect to continue the treatment in these cases in spite of advice, and it is a question whether they should not be under some sort of public inspection. I have never seen a case of amaurotic family idiocy. Mental defect sometimes follows injury or disease of the brain. Being acquired, these defects would not be handed down to the offspring. I have seen two well-marked cases of juvenile general paralysis. Both were in remarkably well-grown boys. Amentia includes all the unclassifiable forms of idiocy, imbecility, and feeble-mindedness. In these cases there is a defective development of brain-tissue resulting from an inborn fault. Clinically it is often important to be able to say whether a young child is mentally deficient. Binet's tests are rather too complicated for ordinary use. A normal child should have control of the muscles of its neck at three months, sit up at six months, stand at twelve months, and walk at eighteen months, feed itself at two years, and dress itself at from three to four years; at one year it should understand simple words, at two years be able to talk, and at five or six to understand letters. If without a good reason a child is unable to do these things at the stated ages, mental defect must be suspected. Rickets may retard the mental and bodily development, but with care can always be recognized. Mental backwardness from sense-deprivation should not be difficult to distinguish from mental defect. It is interesting to consider what part of the brain is at fault in amentia. Children may be born deaf and blind, and yet reach a high state of mental development, as in the case of Helen Keller. I have seen cases of congenital word deafness, blindness, and ataxia, indicating deficient development of parts of the brain, in quite intelligent children. We may conclude that these parts of the brain are not essential in the development of the mind. Intelligence is mainly a matter of memory, and the memory is of peripheral impressions. Touch is the primary sense, and it is probable that mental defect is essentially due to a defect of that portion of the brain, wherever it is, that stores tactile impressions.

THE CENSUS OF FEEBLE-MINDED IN VICTORIA, 1912.

By J. Sandison Yule, M.A., M.D., F.R.C.S.E., Melbourne.

Although this paper principally deals with Victoria, yet I purpose from time to time to refer to results obtained in the census in other parts of Australia, since the problem of dealing with the feeble-minded and the results of the census are very similar throughout the Commonwealth.

The question of the significance and degree of feeble-mindedness in the population is one which has of recent years increasingly engaged the attention of thoughtful men and women, particularly in our Anglo-Saxon communities.

The rise of eugenics as a science—or a pseudo-science, as ultra-conservatives love to call it—marks the modern trend of thought on this subject. To scoff at eugenics is a cheap way of gaining popular applause among the sentimentalists, medical and non-medical, and among those who, not having studied the subject, feel the more perfectly assured that all the talk about it is nonsense. To judge by the flood of ill-informed writing on the question, one may give a sop to the conservative Cerberus by at least admitting that Carlyle's estimate of the majority-composition of the British public holds as true as ever to-day.

Unfortunately, but perhaps inevitably, casual readers are apt to confuse perfectly legitimate, but at the same time highly speculative, hypotheses in the field of eugenics with really ascertained facts, to the detriment of the usefulness of the latter. Thus it is a perfectly legitimate eugenic aspiration to select the fittest individuals in any country to mate and produce the future citizens ; but the attainment of such an aim is hedged about with so many difficulties and drawbacks as soon as we come to any *positive* measures that for the present it may well be left alone. For example, who is to say who are fit and who are unfit in the supreme sense ? Moreover, if the fit mate with the fit, with whom are the unfit to mate, and what will they produce ? Or are they to be legally prevented from mating, and how ? The most casual observer can see a monstrous tyranny and folly possible in this way, or a deeper degradation of the worst class of the population, did such a system attain working efficiency without preventing outside mating among the non-selected.

Then, too, it would be extremely hard to balance the eugenic value of certain characteristics one against the other in making a selection for breeding purposes. Many a mental and spiritual genius would be excluded were we to mate on a basis of bodily perfection alone, and many a deplorable physical weakling included if the mental and spiritual traits alone received recognition.

We are constantly reproached, in our campaign on behalf of care and control of the feeble-minded, with the alleged fact that many of the greatest geniuses of our race have been born of mentally unsound stocks, and the inference has been drawn that we wish to reduce mankind to a dull level of bovine sleekness. Those who urge this argument entirely overlook the fact that while genius may occasionally flower upon the tree of insanity, it never does so on the weedy stock of feeble-mindedness. Feeble-mindedness is quite distinct from insanity ; popularly speaking, we may say that the insane person has a perverted though sometimes fitfully brilliant mind ; the feeble-minded has a mere deficiency of mind.

The definite facts we know about the laws of heredity in human beings are comparatively few in number, it is true, especially those which seem to offer a sphere of practical application, but their paucity does not lessen their importance nor excuse their neglect. Turning to those which affect feeble-mindedness in particular, we may state absolutely that feeble-mindedness is markedly hereditary, and that its hereditariness exhibits itself on pretty definite lines. Thus, where two feeble-mindeds mate, the children are always all feeble-minded—using the word "feeble-minded" in a broad sense of mentally defective. Where one feeble-minded person mates with a normal, a definite proportion of the offspring will always be feeble-minded, and capable of transmitting the defect.

Another proved fact is that the feeble-minded are more prolific than normal stocks. In a widespread American investigation the average number of children in a family where one of the parents was feeble-minded was found to be seven, nearly double the average American (or English) family. Whether this peculiarity be due to a genetic quality or to mere lack of self-control and prudence, may be open to doubt, but the racial significance of the fact is unchanged.

Furthermore, it is a fact, borne out more and more the closer our police records are scrutinized and our petty criminals examined, that a very large proportion of those convicted many times over for minor offences, such as vagrancy, loitering, solicitation, want of sufficient means of support, habitual drunkenness, &c., are really mentally defective. The State spends vast sums of money on enlarged gaols, houses of detention, and reformatories for these persons ; and the public, by way of charitable institutions, spends a large additional amount in every civilized country. Yet these sums would be far more wisely used, and to much better effect, in preventing this welter of crime and squalor by making suitable provision for mental defectives before they have sunk into the crime and vice inevitable for them under the present regime. This meets the deprecating argument of undue expense apt to be urged by Governments against schemes such as we propose for the care and control of the feeble-minded.

Before passing on to other considerations, and with apologies to this learned audience for the introduction of so many elementary platitudes, I must state, to avoid any misconception, that of course we do not set down crimes such as forgery, embezzlement, burglary, murder, nor even *all* instances of the offences above specified, as due to feeble-mindedness. The question of the clever criminal's moral responsibility is not raised nor discussed here ; those we speak of are the persons any careful investigator would pronounce mentally below par considerably.

Feeble-minded children can with a little practice easily be picked out by the Binet tests, which I need not detail here. The child's school-teacher usually has a very fair idea if he is really markedly below standard mentally. When such mental defect is observed it calls first for confirmation by an expert, and, if confirmed, for special treatment in a special school or class. But more of this anon.

In other lands, especially in England and America, much more progress has been made in this work of caring for the feeble-minded, and educating them in the way most profitable to themselves. Particularly in the United States of America are such colonies as Vuieland in evidence, where the feeble-minded child or adult is taken in, cared for, and guarded for his own happiness in a way impossible while he is vainly trying to live the life of the normal citizen or to pursue the course of study of the normal child.

In this country and in Australia little has been done, though I understand that in New Zealand there is an increasing demand for such sheltering institutions, and a law exists for the compulsory notification of feeble-minded children by the school-teacher. Such legislation is not a whit too far advanced, and the provision for these cases should be bettered and vastly extended.

In Victoria we have no permanent care colony for mental defectives apart from our asylums, including the Idiot Asylum at Kew, which is only suitable for the lowest grades.

Yet it is the higher grades which are really a menace to the community and to their own comfort. The imbecile or idiot is blunted in sensibility to a much greater extent than the feeble-minded specially so called. Besides, he is usually somewhat repulsive in appearance, and often torpid in his desires, thus lessening very much the grave risks of propagating his or her undesirable species which attend the irresponsible liberty of the less deeply defective feeble-minded person.

It was to discuss and investigate all this problem that the Australasian Medical Congress at Sydney in 1911 appointed a Committee *re* the feeble-minded, consisting of Dr. Beattie Smith (Chairman), Dr. E. Jones, Dr. H. Sutton, and Dr. Mary Booth (Hon. Secretary), with power to co-opt representatives from each State of the Commonwealth and from New Zealand. At a later date, owing to the resignation of Dr. Booth on her going to England, I had the honour of being appointed Hon. Secretary. What is contained in the report of the Committee to this Congress need not be here recapitulated ; but, briefly, the census was more or less completed in all the States of the Commonwealth except Western Australia. It aimed at reaching the children attending State and private schools through their teachers, to whom were sent memoranda stating the objects of the census, explaining what was wanted and how to elicit the information, setting forth at the same time how the grades of mental defect were differentiated.

The children not attending any school were approached by similar, though not entirely identical, memoranda and forms addressed to medical practitioners throughout the State. An additional question was asked of them as to whether the children were capable of benefiting by special training. These forms were sent to all teachers of State and private schools and to all medical practitioners in Victoria during May, June, and July, 1912. The response was unanimous practically from the State schools, to whose teachers the forms were sent out through the courtesy of Mr. F. Tate, the Director of Education, as departmental returns. The returns in these schools were in duplicate, and the Director has retained one copy in each case for his own use.

The returns from the private schools were expected to be poorer, and amply fulfilled expectations in that direction. In spite of the fact that throughout the inquiry initials only of the defective children were asked for, many teachers seem to have thought the Committee contemplated pillorying them as being the teachers of the notorious John Smith the idiot, or Daisy Jones the imbecile. Carelessness and want of sufficient sense to make the returns seem to have contributed to their silence in other instances; so that, since negative as well as positive returns were asked for throughout the census, the response of sixty-three teachers out of 462 circularized does not reflect much credit on the intelligence of the private instructors of our youth in Victoria.

I may here state that, on the whole, the Roman Catholic schools replied better than the rest; this was doubtless in part owing to the note of approval given us by His Grace Archbishop Carr, to whom we are much indebted.

The response from the medical profession was deplorable—only forty-nine out of 824 replying at all. Evidently our profession needs educating on this important question. Every effort was made by means of a special B.M.A. meeting, notices and letters in the *Australasian Medical Journal* and elsewhere, to stimulate interest, but, as the figures show, in vain. True, many doctors have little time, but this would have taken less than a quarter of an hour in many cases. True also that many men are too busy to keep records, yet they might have recollected some cases at least, as some of the busiest did. True also that some doctors knew no feeble-minded cases (their work lying in some specialty), yet they might have said so. When all excuses are made, the results exhibit deplorable apathy, and our only consolation as a State was that most of the other States were as bad; while Tasmania exhibited the proud spectacle of four medical men who thought enough of their own Congress, or indeed of their own country's welfare, to reply. Incidentally, Tasmania's returns are made to include no idiot, but this is too good to be true!

The number of children reached in the Victorian State schools was 175,000; those reached through private schools and doctors cannot well be estimated.

After the census was taken a Victorian Committee was formed to deal with its results, consisting of the members of the Central Committee, with Drs. C. G. Godfrey, A. J. Wood, Professor Laurie, and Mr. G. Tregarthen of the Victoria Government Statist's Department. To the latter gentleman we are much indebted for his assistance in classifying the results of the census.

The results of the census disclosed that 3,452 children in the State schools, forty-eight in private schools, and twenty-nine known to forty-nine doctors as not attending school or in institutions were regarded as *mentally dull*—a total of 3,529.

Classed as *feeble-minded* were 618 in State schools, eighteen in private schools, thirty in the Idiot Asylum, and thirty-one not attending school known to the forty-nine doctors who replied—a total of 727.

In the grade of *imbecile* were placed 116 in State schools, five in private schools, 154 in the Idiot Asylum, and thirty-four known to the forty-nine doctors not attending school ; total, 309.

As *idiots* were numbered seventeen in State schools, one in a private school, 133 in the Idiot Asylum, and five known to the forty-nine doctors reporting—a total of 156.

Among these were 132 epileptics, excluding the Idiot Asylum cases.

It must be remembered that these figures must vastly understate the actual number of defectives, since the figures for children not attending school might well be multiplied by seventeen, especially as many of the non-replying medical men are privately known to the Committee as having practices sure to contain many patients of this type. A very conservative estimate must at least demand multiplication by ten, and this would mean a total number of defectives below or within the degree of feeble-minded amounting to 700 not attending any type of school or under any efficient care and control. Add to this, 751 in State schools reported, and at a very moderate calculation 120 in private schools, and we find 1,571 mental defectives below the grade of mental dullness not in receipt of education suited to them or under sufficient control and care to preserve them from the consequences of their own weakness, or to prevent their prejudicially influencing the community ; and this entirely apart from the consideration that many of the 3,259 labelled " mentally dull " must assuredly be more correctly included in the lower grades. This state of affairs loudly calls for legislative action and provision.

So far the only beginning made is the establishment by the Victorian Education Department of a day school for feeble-minded children in Bell Street, Fitzroy, a suburb of Melbourne. Here there are about seventy children—naturally not of the worst classes of mental defect. Obviously this only touches the fringe of the needful provision. It is imperatively necessary that more schools of this type be provided in the larger centres, their primary object being to take those children reasonably suspected of mental defect, weed out those wrongly so suspected, return them to ordinary education, select those really affected, and transfer them by preference to residential schools where their training may be conducted by experts in manual pursuits especially, and also in scholastic channels, so far as this is found desirable. Such residential schools are in operation in Europe and America, and we may benefit by their experience in the lines on which we establish ours. In these schools there may also be classes for doubtful cases from the more scattered districts, from which the non-defectives can be gradually eliminated, as in the special day schools in centres of population.

The work of the Montessori system may be here alluded to, though time is lacking for entering into details of this or any other method. But over and above these schools for the defective children remains the absolute necessity for after-care colonies for the permanent guardianship and segregation of adult defectives. Experience abroad shows emphatically that this is in the interest of the feeble-minded themselves. They are far happier in such sheltered homes than vainly endeavouring to compete in a world which has no time for them, and in which they are doomed to inevitable failure and disaster.

In sexual matters especially, the feeble-minded person has no self-control, instances being frequent, such as that reported in our census of a feeble-minded woman returning eight times to one hospital to give birth to illegitimate children, many of them also feeble-minded, and most of them capable of transmitting the defect in later years.

Naturally the sexes would be rigidly separated in these colonies, and the expenditure in instituting them would be amply recouped by the saving eventually effected in the money spent on caring for these unfortunates in gaols and charitable establishments. Such colonies exist in a very flourishing condition in England, and especially in the United States. They are there, however, severely handicapped by the want of legal power to detain the inmates after their eighteenth year without their consent. Thus by the mere whim of a mental defective or his vicious or stupid guardian one of the worst cases may be turned loose, to the serious detriment of the community and himself, at any moment unless the patient be certifiable as insane. Some power of compulsory detention is thus urgently required. Admission to such homes would then naturally demand adequate legal safeguards, while errors could be remedied by periodical inspection and examination of inmates.

If such means as these of dealing with the problem of the feeble-minded be adopted, there will be no need for the undesirable remedy of sterilization. This is repugnant to the feelings of the mass of the public, and, though possibly justifiable in a very few cases, and though nominally legalized in certain States in the United States of America, is (in the judgment of those best qualified to pronounce on the matter) both unnecessary and inferior to the segregation plan. In this connection it may be noted that it would be irrevocable, and that there would be a moral danger to the community in the presence in its midst of a large number of known steriles.

Among the mental defectives, or separated from them, moral defectives would also require provision. Our census, from the way it was taken (mainly through school-teachers), was unable to enumerate these; but they exist, and above all others call for control and care. Happily in Victoria we have been able to do something towards realizing these ideals—not much, but a first step in the right direction.

A large deputation, comprising the members of the Victorian Committee and various prominent medical men of Melbourne, waited last year on the Hon. J. Murray, the Acting-Premier of Victoria, and laid the case before him. The deputation received a sympathetic hearing from Mr. Murray and the Minister for Education, the Hon. A. Peacock; and subsequently Mr. Murray commissioned Dr. E. Jones, a member of the Congress Central Committee and Inspector-General of Insane in Victoria, to draw up a Bill dealing with the whole subject. Dr. Jones has this now in hand, and although we realize that the crux will come when the making of provision on the estimates for the establishment of schools and colonies is faced, yet the cordial recognition of the principle of legal control and the sympathetic attitude of the Ministers we interviewed encourage us to hold the highest hopes for the future.

THE DIFFICULTY OF SECURING RELIABLE STATISTICAL DATA.

By Dr. C. S. Willis, Sydney.

In common with the other States the Education Department of New South Wales recently instructed teachers to forward a return showing the number of backward and feeble-minded children in each school. Our experience in New South Wales has shown me most conclusively that it is useless to expect teachers to furnish this information in a reliable form. The teachers were asked to furnish the sex, age, class, and to state whether the child was—(1) backward from accidental causes; (2) mentally dull; (3) feeble-minded; (4) imbecile; (5) idiot; and (6) whether the pupil was epileptic, deaf, blind, or paralytic. The results, when summarized, were so ridiculous as to show the complete fallacy of expecting teachers—especially young inexperienced teachers of bush schools—to make anything like a reliable diagnosis. Even teachers of the highest classification failed to grasp what was required.

A few examples will illustrate better than words the futility of expecting teachers to furnish returns that may be accepted. At a large school in one of the finest residential areas in Sydney the return furnished by the headmaster—a man who takes an active part in all educational movements—showed that out of an average attendance of 404, fifty-six pupils were mentally dull. Altogether, seventy-six pupils were returned as requiring special schools, although in many cases they were in a class where the average age was no greater than that of the child concerned. It is impossible to believe that one out of seven children in the school were mentally dull. At a neighbouring school, almost equal in numbers and under identical conditions, the teacher returned twenty-five children as being backward, mentally dull, or feeble-minded, but of these only two were reported to be mentally dull. Thus we have two schools, with almost equal numbers, working under identical conditions—one teacher reports that he has fifty-six mentally dull children, the other that he has two. At another school not more than two miles away, working under practically the same conditions and attended by the same class of pupil, the infant-mistress reported that fifteen pupils were mentally dull, giving as a reason in the majority of cases "irregular attendance." Teachers do not appear to realize the difference between a child who is backward from such accidental causes as irregular attendance, late enrolment at school, unpunctuality, &c., and the child who is mentally dull. An age standard is apparently set for each class, and if a child is older than a majority of children in the class the teacher classes such pupil as "mentally dull."

Under ordinary circumstances a normal child is expected to enter the Third Class—or, as it is called in New Zealand, the Third Form—at or about the age of nine years; yet statistics show that in 1912, 83 per cent. of the pupils in Third Class were over ten years and 56 per cent. over eleven years. Notwithstanding this, two children were returned as "mentally dull," although they had reached the Third Class at the age of eight, while nine children were classed as mentally dull because they had not reached the Third Class until they were nine years of age. And this while 83 per cent. of Third Class pupils are over ten years! Sixty-three per cent. of the pupils in the Fourth Class are over twelve years, and yet teachers returned as mentally dull four pupils who were apparently so exceptionally bright as to get into the Fourth Class at the age of ten. It is hardly credible that a teacher could class as "mentally dull" pupils of the age of five, and yet in three instances this was done; while no less than thirty-one children were stated to be mentally dull, although they were only six years of age.

Apparently the teachers had no conception of what was required, and were unable to distinguish between a child whose education had been retarded through exceptional causes and one who was actually mentally dull. In many cases I have no reason to doubt that the mental dullness alleged would disappear with a change of teacher. The majority of teachers apparently base their diagnosis wholly upon the age and class of the child. As they do not appear to recognize the distinction between a child who is mentally dull and one who is feeble-minded, it is not hard to understand that they were unable to draw the finer distinction between feeble-minded, imbeciles, and idiots.

I am convinced that a much simpler form is required, and that specific instructions must be given to teachers as to the various distinctions. The whole question is full of difficulty. Teachers do not possess the necessary training to enable them to come to a right decision, while the medical staff cannot afford to spend the time necessary to discover the mentality of each pupil in every school. It is obvious that the greatest care must be exercised in basing conclusions upon the figures supplied.

DISCUSSION.

Dr. ARTHUR JEFFREYS WOOD (Melbourne) spoke of the need for private institutions for the feeble-minded child—that there was a wide demand for such institutions, and at present no possibility of meeting it.

Dr. R. M. Beattie (Auckland), Dr. J. S. Farries (Minda, South Australia), and Dr. J. W. Springthorpe (Melbourne) took part in the discussion.

RECOMMENDATIONS TO CONGRESS FINAL MEETING.

PROPOSED by Dr. J. SANDISON YULE (Melbourne), and seconded by Dr. SWEET (Auckland), That this meeting of the combined Sections of Psychological Medicine, Public Health, and Diseases of Children respectfully urge Congress to recommend to the State Governments of Australia and the Government of the Dominion of New Zealand that they take into consideration with a view to legislation at the earliest possible moment the final recommendations of the Report of the Congress Committee on the Care of the Feeble-minded, viz.:—

(1.) Day schools in large centres to train all children reasonably suspected of mental defect. These will eliminate children wrongly classed as such, and qualify them for further education through the ordinary channels. The identification of the rest they would confirm.

(2.) Residential schools for children of the same doubtful class from scattered districts and for children definitely judged to be mentally defective. Classes of the type found most successful in other lands will be here available for the purpose of completing the children's training—both manual and scholastic, so far as the latter is found to be desirable and useful. In this class may also be mentioned the small paying schools. It will be necessary to provide for the mentally defective children of the more well-to-do parents when the latter are unable to provide satisfactory care and control at home. These institutions could be worked either separately or in conjunction with the non-paying school.

(3.) In connection with the residential schools, to some extent, and probably also by preference in separate country localities, residential colonies with separation of the sexes for the permanent care of the feeble-minded on attaining adult age, when not of so low a grade as to call for confinement in such institutions as idiot asylums.

The detention of mental defectives in these colonies will, of course, presuppose adequate legal safeguards to avoid any possibility of error; this could be further provided against by periodical inspection.

Moral defectives might be dealt with to a large extent by these institutions, or might require some special provision.

Such colonies exist in England and America, but are handicapped by the want of legal power to detain. This should certainly be granted, as otherwise the worst cases from the point of view of the community would have to be allowed to roam at large.

The consensus of opinion of all who have seen the colonies in operation is that the feeble-minded are far happier as well as safer in them than when left to the mercy of ignorant parents or a world which has too much to do to make allowances for them, or prevent their misconduct or disaster. The expense of instituting the colonies would undoubtedly be large, yet truly economical when the present expenditure on misdealing with the feeble-minded in gaols and charitable institutions is weighed in the balance.

By such means alone can the State hope to prevent the feeble-minded forming the large proportion they do of our habitual criminals, drunkards, prostitutes, and wastrels, and thus alone with propriety can they be prevented from propagating their undesirable type in the make-up of future generations.

Proposed by Dr. C. G. GODFREY (Melbourne), seconded by Dr. G. H. BUTLER (Brisbane), That existing Committee on Care and Control of Feeble-minded, with the State representatives, be reappointed, with power to add to their number.

METHODS OF EARLY TREATMENT OF INSANITY.

By Dr. W. ERNEST JONES,

Inspector-General of the Insane, Victoria.

ON the necessity for early treatment in cases of mental disorder we must all be quite unanimous, but that the treatment should be of an institutional character there is not the same unanimity of opinion; and it is more than probable that any such disagreement is largely due to the fact that we have not all had the same degree of experience in the matter of special institutions devoted chiefly to the care and cure of early and remediable cases of insanity. Medical practitioners and relatives are at one in desiring to avoid certification in the majority of recent cases, and, as in most countries some such legal procedure is necessary before a patient can be received into a proclaimed institution for the insane, it follows that procrastination and evasion become the order of things. Invaluable weeks or months are thus lost, during which the delusion becomes fixed, the bad habit confirmed, and the bodily functions, subordinated to the disordered mental functions, react on the mind, thus forming a vicious circle from which there is no escape.

Comparatively few medical men recognize to what a grave extent the numbers of the insane and unfit are increasing in our midst, unless they have had personal experience of hospital and asylum work; statistics other than British and Australian are incomplete and difficult to obtain. They are also based on varying methods, so that comparison is difficult. In some countries congenital cases in special institutions are not included in the statistical return of those who are insane, and in some important countries no complete census is made. However, I think it is worth while to quote a few returns that I have collected from various publications. I regret their lack of uniformity, and can only give them for what they are worth.

Whatever may be the various contributory factors, the succeeding figures referring to Germany and America are eloquent of the rapid rise of registered insanity in those countries:—

	Year.	Total Registered Insane.	Proportion of Insane to Population.
Germany	1877	40,375	1 in 1,096
	1897	101,165	1 in 518
	1907	198,412	1 in 313
United States of America ..	1890	74,028	1 in 850
	1910	187,798	1 in 490
State of New York	1890	14,405	1 in 417
	1912	31,624	1 in 297

Beyond the fact that these statistics are taken from reliable publications, I am unable to say whether they will compare completely with our returns—for example, I am unable to say whether institutions for defectives are included. However, we can obtain returns from the United Kingdom and Australasia, more interesting to ourselves and possibly more complete.

	Year.	Total Registered Insane.	Proportion of Insane to Population.
England and Wales	1879	69,885	1 in 363
	1909	128,787	1 in 275
	1913	138,377	1 in 267
Ireland	1871	16,505	1 in 328
	1881	18,413	1 in 279
	1911	28,437	1 in 154
Scotland	1891	12,595	1 in 317
	1913	19,188	1 in 247
Victoria	1877	2,719	1 in 300
	1881	3,179	1 in 271
	1891	3,868	1 in 295
	1901	4,501	1 in 301
	1912	5,579	1 in 247
New South Wales	1877	1,695	1 in 380
	1881	2,080	1 in 360
	1891	3,134	1 in 359
	1901	4,475	1 in 303
	1912	6,470	1 in 275
South Australia*	1877	478	1 in 494
	1881	606	1 in 462
	1891	815	1 in 393
	1901	988	1 in 367
	1912	1,082	1 in 398

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* Patients in asylums only, and not including institutions for imbecile children.

	Year.	Total Registered Insane.	Proportion of Insane to Population.
Queensland	1883	679	1 in 423
	1891	1,191	1 in 331
	1901	1,747	1 in 285
	1912	2,322	1 in 274
New Zealand	1877	872	1 in 479
	1881	1,175	1 in 426
	1891	1,849	1 in 343
	1901	2,773	1 in 284
	1912	3,913	1 in 269

The variations between these separate countries are capable of fairly accurate explanation, but the general trend of these returns goes to show that rather more than one person in every three hundred has to be detained in an appropriate institution, and that nearly one person in every thousand of the population is received annually; that the registers show an increase of one-third every ten years, and the probability is that even this large addition does not wholly account for the total number of rejects flung on humanity's scrap-heap.

Reviewing these figures, the question that presents itself is whether our administrative, legislative, and social methods are not largely responsible for the existing condition of things, and whether we really do recognize the importance of early treatment.

So far as the principal causal factors of insanity are concerned, three stand out most prominently—the inheritance of insanity and its allied neuroses, syphilis and alcoholism. We may possibly derive some benefit from the study of heredity, and learn ultimately how to checkmate the influences of ill mating; we may stamp out or considerably mitigate the effects of both syphilis and alcoholism; but there still remains one causal factor which is, in my opinion, potent for ill—in that the study and cure of mental diseases has been alienated from the general study of disease of the body. This alienation, aggravated by our "liberty of the subject" ideals, has completely prevented the adoption of early-treatment principles, and we are now faced with the necessity of making a strenuous attempt to obtain the recognition of value and possibilities of voluntary treatment.

As Professor Meyer says, "Disease (of the body) brings us to our senses," but disease of the mind is an obvious exception to this aphorism, and its study and treatment is the more difficult on account of the fact that it is almost impossible to attempt it in the ordinary wards of a general hospital, and because it is most unusual for a person in the early stages of mental derangement to recognize the necessity for treatment, especially when he believes that it may mean the deprivation of his liberty. His certification and committal to an institution where his fellow-men will consist almost entirely of chronic and uncured cases of mental disorder is certain to be repulsive to him, even if he has sufficient power of reasoning left him to feel that institutional or rather hospital treatment would be of service to him.

In any case, the question of environment must prove a very considerable factor in each case; and the individual committed to an institution containing many hundreds of patients must feel dispirited by the feeling that he has not been given a chance to recover himself by more individual treatment than he can possibly get in the large reception ward of a still larger asylum for the insane.

It is on this account that receiving-houses, small acute mental hospitals, and psychiatric clinics appeal not only to the patient himself, but also to his friends and to those engaged in this branch of medicine who have had experience of such preliminary institutions. The advantages of such institutions may be tabulated as follows :—

1. Of interest to the individual—
    - (*a*.) Ready methods of admission.
    - (*b*.) Early treatment of recoverable cases.
    - (*c*.) Correct classification.
2. Of interest to the medical profession—
    - (*a*.) Teaching of psychiatry.
    - (*b*.) Original research in mental diseases.
3. Of interest to the nation—
    - (*a*.) The prompt removal of cases that menace the public safety.
    - (*b*.) Economical administration.

The one vital principle essential for the success of these institutions is the recognition of the value of "voluntary admission." This is provided for to some extent in many countries by the inclusion in the Lunacy Act of clauses permitting and regulating the admission of voluntary boarders; but in my opinion the psychiatric clinic, or the receiving-house, or whatever is the "first line of defence," should be permitted to admit patients without any certificate or other legal sanction. It is also advisable that an out-patient department should be run in connection therewith, as it would tend to increase the "voluntary" idea, and approximate the institution to the best "hospital" ideals.

The English Lunacy Acts have since 1890 contained clauses for the admission of voluntary boarders. The recent New Zealand Act has similar clauses, and projected and attempted amendments in the New South Wales and Victorian Acts aim in the same direction. Unfortunately, the most recent legislation in these lands does not contain anything in the way of voluntary clauses—I refer to the new South Australian Mental Deficiency Act, in which I think a very good opportunity has been missed for advance in the best modern way.

At the present time I recognize that the absence of the voluntary admission is, in Victoria, having a very serious effect, in preventing the admission of early cases of mental diseases where the patient or his relatives are well off and disinclined to avail themselves of the public institutions. The licensed houses in this State can only admit patients under certificates, and not even under the same certificates as would secure their admission into a receiving-house. The consequence is that they are received into private hospitals, where, as they invariably prove difficult to manage, outrageous charges are made for their care and treatment, with additional fees for extra nurses, or male attendants if the patient is of the male sex.

As exemplifying the different trend of legislation in the United Kingdom and the States of the Commonwealth, I would point out that the private licensed houses in the former country admit voluntary cases, and there is no provision for the admission of such cases into county and public institutions, whereas on this side of the world the tendency is in the opposite direction; we either possess the right to admit voluntary cases to our State institutions or we do it without having the legal right, and are content to run the risk of so doing, and, speaking for the Lunacy Department of Victoria, would rather welcome a *cause celèbre*, as it would certainly have the effect of hastening legislation providing for the recognition of the voluntary principle.

The establishment of early-treatment institutions must necessarily modify the character of the chronic institutions, since a less number of acute and curable cases will be admitted therein; their recovery-rate will diminish almost to a vanishing-point, but that will be a secondary matter if a larger number of cases have been prevented; their construction and equipment need not be so elaborate and expensive, and they would become industrial colonies rather than hospitals.

As one way of working out a scheme for a Lunacy Department, I would bring to your notice the report of the Massachusetts Board of Insanity, which has worked out a scheme of institutions—acute, intermediate, and chronic—calculated on the cost of trolly rides out of the City of Boston, a somewhat unique but nevertheless a practical scheme. This report recommends that the State should erect—(1) a psychopathic hospital for 120 beds in the City of Boston; (2) a voluntary and convalescent branch in the suburbs; (3) a custodial and infirmary centre within a 10-cent. trolly ride; (4) a farm colony within a 25-cent. trolly ride.

It further states that 10 per cent. of the total accommodation is wanted for the acute and curable class; 40 per cent. is wanted in the farm colony for harmless, quiet, able-bodied, chronic patients; 50 per cent. is wanted for the dangerous, untrustworthy, and infirm chronic patients. But the report does not say how much accommodation is necessary under the second heading—*i.e.*, for the voluntary and convalescent cases; probably only a comparatively small institution is intended.

Later on the report states that, in the opinion of committing physicians, 21·5 per cent. of their patients who are sent to insane hospitals might be treated under the voluntary section in general hospitals. This latter statement, if true, is a scathing criticism on the way general hospitals of the present day view the question of the treatment of early cases of mental disorder, their principal object being to get rid of them at the earliest possible moment—drugged and restrained very frequently—to the nearest reception-house or hospital for the insane.

The psychopathic clinic attached to a general hospital is not to be confused with the isolation wards, where noisy and troublesome cases are temporarily accommodated. It should be a self-contained unit, its size depending on the extent of the general population served by the hospital; possibly a block or blocks for twenty to thirty males and twenty to thirty females would suffice for a city containing 500,000 people. Day rooms, associate dormitories for four, six, or eight persons, with single-room accommodation for one-third of the total number, should be provided. Verandas broad and protected, gardens, good bathrooms, clinical examination-rooms, all go to make up the necessary equipment. A special visiting staff is necessary of course, and consultations with the other members of the hospital staff are an essential feature, and the special methods of treatment to be found in other portions of the hospital should be made available for the patients of the clinic. If this city of 500,000 persons supports a medical school the clinic will become the immediate teaching-centre of psychiatry, and the usual course of instruction will require to be supplemented only by a few lectures on the more chronic forms of insanity given in the wards of the large custodial institutions for the insane.

The frequent attendance of medical students in the clinic will do much to raise the interest and increase the knowledge of the profession in the subject of insanity, especially if each student were required to do a three-months course of clinical work in these wards. They would then realize the importance of sending their cases of mental disease at as early a date as possible (when they were fully launched in the practice of their profession), and we should no longer have marked cases of general paralysis, senile decay, and congenital defect sent for observation to our existing receiving-houses and acute hospitals.

Whether such an institution would entirely do away with all preliminary observation and reception houses I am not able to say; I think possibly not, but it would obviate the necessity of building small and separate mental hospitals for the recent and recoverable cases; all that would be necessary would be to have separate and well-equipped special wards in the grounds of the larger general hospitals, into which voluntary cases also could go.

The psychopathic clinics which have been established in the United States, following the lead of Germany, are the very centres of scientific advance and progress in psychiatry; the amount of literature which has emanated from them—both American and German—is strongly indicative of their utility.

In recommending this method of procedure for the development of a Lunacy Department, I am very far from wishing to disparage the success that has obtained by the establishment of receiving-houses at Sydney and Newcastle in New South Wales, and at Melbourne and Ballarat in Victoria, or the progress being made by the Mental Hospital for Recent Cases in Melbourne, which is run in connection with the receiving-house; but I realize, so far as Victoria is concerned, that the four miles which our receiving-institutions are from the centre of Melbourne and the two miles from the Medical School are very decided obstacles in the way of popularizing the study of mental diseases with medical students and practitioners, and consequently with the general public, who cannot help but recognize the alienation of the study and treatment of mental diseases from those of the body.

In the meantime I think that we should shape our endeavours to obtaining from our various legislative bodies the recognition of the voluntary principle, without which we cannot hope to do more than make very limited progress.

DISCUSSION.

Dr. J. SANDISON YULE (Melbourne) said he cordially agreed with Dr. Jones's views as to the necessity for hospital and voluntary treatment of incipient cases of insanity. The practice in hospitals at present was to get rid of these patients to a receiving-house or asylum as soon as possible. Yet these cases could very often be easily treated as hospital patients, and the pain to the patient himself and his friends of certification avoided. The hospital clinic would also be most valuable for training students. At present medical men generally know appallingly little about mental disease and its treatment, especially in early cases. Students have just now perfunctorily to attend certain classes at more or less distant asylums; they do not see many early cases, and get little insight into their appropriate treatment. Hospital clinics would change this altogether for the better.

Proposed by Dr. R. M. BEATTIE, seconded by Dr. J. SANDISON YULE, and passed, That the Section of Psychological Medicine is strongly of opinion that the time has arrived when the early treatment of mental disorder should be undertaken in general hospitals, in specially provided wards attached to or separate from the general wards of the hospital, and that for this purpose a specially trained assistant should be appointed to the hospital.

HYPERTROPHIC SCLEROSIS OF CEREBRAL CORTEX.

By W. A. T. LIND, M.B., B.S.,

Pathologist, Lunacy Department, Victoria.

MR. PRESIDENT and gentlemen,—Two out of eighteen post-mortems held at the Idiot Cottages, Kew, Victoria, between May, 1912, and May, 1913, had the appearance described by Sherlock in his book called "The Feeble-minded," under the heading "Epiloia Type of Idiocy." The features of the cases are so similar, even to the post-mortem appearances of the brain and kidneys, that I am bringing them under your notice in the hope that they may be of interest to those who have come across similar cases, and a guide to those who have so far no acquaintance with the condition. I am certain that no one could mistake the disease after having seen or heard it described, as the features are distinct from any other condition.

It was only when the second case appeared so soon after the first one in the post-mortem room that I commenced making some investigations about the condition which had first been brought under my notice by Dr. Elkins at King's Langley Asylum, England. Unfortunately, by that time some of the best material had been neglected, and was spoilt for photographic work. The condition has been well described in Europe by competent observers, and all agree that the disease is a rare one. For those who wish to read up the recorded cases, I append a list of references. Besides these two cases post-mortemed by myself, I have been fortunate in discovering in Melbourne other cases during my investigations, and I will describe them also. The cases are—(1.) R. T. W. (male): Case at Idiot Cottage, Kew; dead; post-mortemed by me. (2.) R. J. H. (male): Case at Idiot Cottage, Kew; dead; post-mortemed by me. (3.) A. R. (female): Case at Idiot Cottage, Kew; dead; post-mortemed by Dr. Mackeddie. (4.) J. (female): Backward child shown by Dr. Crowley at his clinic on skin-diseases at the Alfred Hospital, Prahran; the child is suffering from adenoma sebaceum. (5.) R. L. (male): Case at the Idiot Cottage, Kew; is alive, has fits, is idiot, and suffers from adenoma sebaceum. (6.) N. A. (female): Case at Idiot Cottage, Kew; is alive, has fits, is idiot, and suffers from adenoma sebaceum. (7.) M. E. B. (female): Case at Idiot Cottage, Kew; is alive, has fits, is idiot, and suffers from adenoma sebaceum.

Patients (4), (5), (6), and (7) are still alive, but I have no doubt that they are cases of hypertrophic sclerosis. Cases (1), (2), and (3) appear to be the same clinically and in the post-mortem room.

There are several names given to the condition—(1) Hypertrophic sclerosis of the brain; (2) tuberose sclerosis; (3) sclérose hypertrophique (Bourneville); (4) hypertrophic nodular gliosis (Sailer); (5) epiloia and anoia (Sherlock); (6) neurogliosis ganglio-cellularis diffuse (Hartdegen and Neurath).

Definition.—The disease is a hypertrophic sclerosis of the cortex of the cerebrum, with nodular swellings on the floor of the lateral ventricles. It is nearly always associated with skin-disease called adenoma sebaceum, and has growths in the kidneys, more rarely in the spleen and lungs. It is practically always accompanied by mental deficiency, and sooner or later by epilepsy. This is a crude definition, but you will see as the paper proceeds that the cases I am dealing with, although they may differ in detail, yet conform to the above description in general.

The *cause* of the disease is unknown. Some of the theories of etiology will be mentioned later on. The attention of the medical man may first be drawn to the condition by the parents bringing a child under his notice for either mental backwardness, adenoma sebaceum, or epilepsy. Either of the symptoms alone may be the first appearance of the disease, so I will give a short description of the condition called adenoma sebaceum, which is not so well known and yet has such an important bearing on these cases.

Adenoma Sebaceum (Butterfly Disease).

Rarely seen in mentally normal people.

It is known by other names—(1) Epithelioma adenoides cysticum; (2) naevi vasculaires et papillaires; (3) vegetationes vasculaires.

Crocker calls it a disease composed of neoplastic papules on the face, of congenital origin, but of late development. Barr says that he could find only twenty-one cases recorded, and Crocker says that the subjects are often epileptic. Barr says that three of the four cases he has seen are epileptic.

The distribution of the lesions is symmetrical on cheeks, forehead, and chin.

The lesions are roundish papules, varying from pin-point to split-pea in size, and are of a warty-like growth. The colour of the lesions is bright crimson, due to telangiectatic vessels investing them. They may be slightly coloured, translucent, or waxy. When thickly grouped they usually assume cinnamon or brownish tints, occasionally paling on pressure. A few scattered lesions may be present at birth or appear gradually in early childhood, or they may suddenly increase in number, but not in size, at puberty. Once established, the disease has a tendency to remain stationary. The papules occasionally undergo involution, leaving scars, that fade in time. All cases so far reported, except two of Crocker's, show mental deficiency.

The differential diagnosis is between hidradenoma, colloid milium, and acne rosacea. There is no treatment for the condition.

It might be of interest to state that there are three types of adenoma sebaceum described—the white, the pink or Pringle type, and the warty type. All the cases (4), (5), (6), and (7) have the Pringle type.

I made a section of a piece of M. E. B.'s growth, and examined it microscopically. I realized the telangiectatic blood-supply before I had controlled the haemorrhage, even the suture holes requiring strong liq. ferri perchlor. to produce haemostasis. The condition shows the corium thickened with hypertrophy of the sebaceous glands and rudimentary hair-bulbs.

Other skin-defects are frequently present, such as fibromata, pigmentation, true naevi, and warts. So much for the skin-condition. Now to return to the hypertrophic sclerosis,—

Age.—The condition dates from birth. Fifty per cent. of the cases have fits during the first year, but as the symptoms increase with the child's growth, the ages at which the cases come under observation vary according to the intelligence and observatory powers of the parents. Campbell gives the age-limit of the disease as twenty-five.

Heredity.—Although the cases that I have been able to investigate do not show, on the whole, constant weaknesses in the family chart, yet it is generally recognized that a neuropathic heredity is met with in these cases.

Locality.—There is no special locality or country for this condition.

Sex.—Both sexes are about equally affected.

The disease tends to shorten life ; about two-thirds of the patients die before the sixteenth year.

Campbell says that the constancy of the syphilitic taint has yet to be proved. Opinions are divided on this point. One of the cases postmortemed at Kew had given a positive Wassermann reaction, and the other had given a negative. Fowler and Dickson, in their report of twenty-five cases, say that syphilis is a not causal factor, but they do not explain the reason of the high cytological count of the cerebrospinal fluid in their cases, which went 40 lymphocytes to the cubic millimetre. A lymphocyte count of 40 to the cubic millimetre is usually considered as significant of either cerebro-spinal syphilis, tubercle, general paralysis of the insane, or tabo-paresis.

The convulsions may be either petit mal, grand mal, or Jacksonian in type.

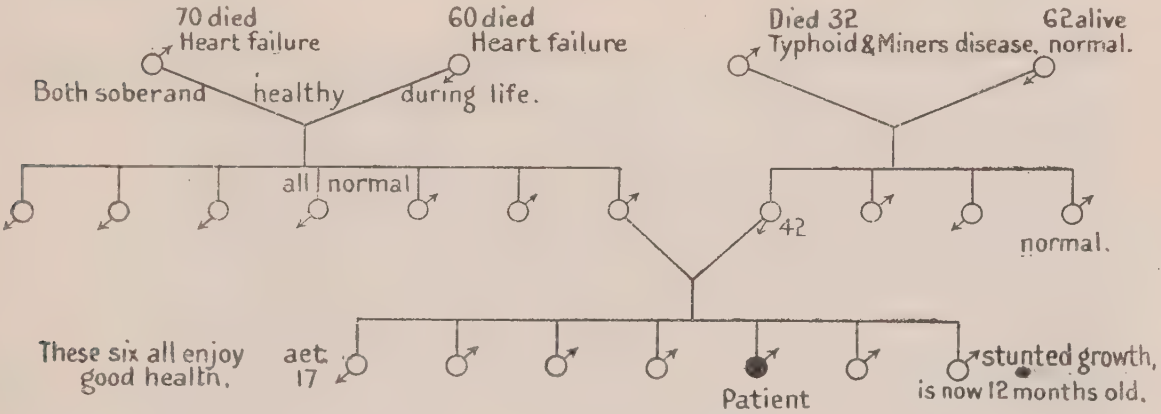
Case (1).—R. T. W. Idiot Cottage, Kew. Received, 18/5/12.

Notes on Reception.—Male, aged seven. Born Tasmania. Father is a railway employee. Condition has dated from birth. Epileptic idiot, with defective habits. Inability to talk, though seven years of age. Constant purposeless movements. Dribbling and idiotic, facile, has frequent fits. Is dull, and seems to be incapable of reacting to almost any stimulus, especially pain. Takes no notice of any one speaking to him. Does not respond to his own name. Cannot talk. Weight, 3 st. 7 lb. ; height, 3 ft. 8 in. Can walk, but drags legs about. High arched palate. Wassermann negative.

10/10/12 : Died from broncho-pneumonia.

Family History.—No consanguinity, alcoholism, phthisis, nervous or neurotic members. The mother is said to have sustained a nervous shock during gestation of child. She saw a neighbour's child in convulsions, and shortly afterwards she quickened. Patient had teething fits. Neither father nor mother had any illnesses of kind.

Family Chart.—


70 died
Heart failure
60 died
Heart failure
Died 32
Typhoid & Miners disease.
62 alive
normal.
Both sober and healthy during life.
all normal
42
normal.
These six all enjoy good health.
aet. 17
Patient
stunted growth, is now 12 months old.

Post-mortem Notes.—11/10/12: Male child, of about seven years of age, emaciated and has contractures of wrists. No rash noticed at the time of post-mortem, but the nurse says that he had some pinkish marks around the mouth when he was alive, the marks being like those of a patient who had undoubted sebaceous adenoma, only they were not so well defined. As I was not looking for the condition at that time it would be quite possible that it was overlooked. The pericardium was full of clear fluid. Right heart dilated, spleen normal, very little blood in the body. Broncho-pneumonia of both lungs. Mesenteric glands show up well in the emaciated mesentery, but are not caseous. Liver shows subcapsular mottling, and is tougher than normal. Both kidneys tough, the capsule splitting on stripping. In the cortex are cream-coloured growths, firm and not depressed. On removing the calvarium and dura mater the cortex feels irregularly hardened. This change involves the cortex and also the floor of the lateral ventricles, the latter showing varying-sized lumps, like candle-grease gutterings.

The direct cause of death was broncho-pneumonia. The weights of the organs were: R. hemisphere, 20½ oz.; L. hemisphere, 20½ oz.; pons and cerebellum, 6 oz.; heart, 6½ oz.; R. lung, 15 oz.; L. lung, 15 oz.; liver, 30 oz.; R. kidney, 2½ oz.; L. kidney, 2½ oz.; spleen, 2 oz.

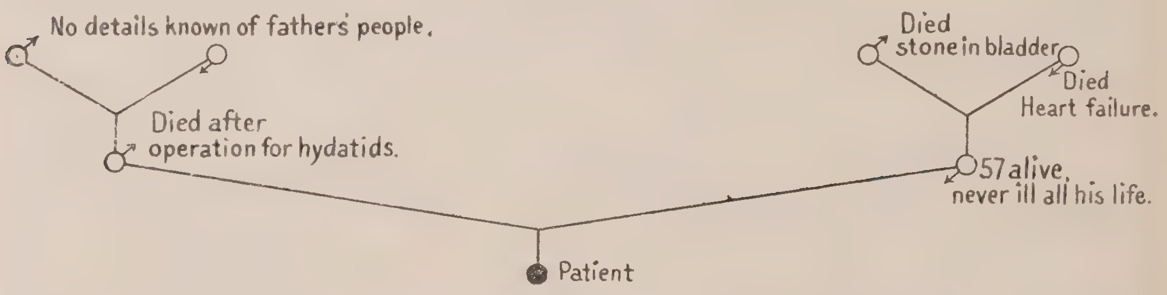
The microscopic findings will be described later on.

Case (2).—R. T. H. Received Idiot Cottage, 15/5/09.

Notes on Reception.—Aged twelve. Congenital. Cause not known. Epileptic idiot. Born in South Australia. Defective habits. Does not walk or talk, although past twelve years of age. Is unable to stand. Purposeless movements of body, and gnaws his hands; quite unintelligent. Not able to recognize any person, not even his mother. Makes inarticulate noises with his lips. Cannot feed himself. Congenital epileptic idiot. Teeth decayed. High arched palate. Fits severe in type. Requires to be fed. Positive Wassermann. Developed measles and died, 20/3/13, from broncho-pneumonia.

Family History.—Mother writes, "I think my little son was born like he was."

Heredity Chart.—


No details known of fathers people.
Died after operation for hydatids.
Died stone in bladder
Died Heart failure.
57 alive, never ill all his life.
Patient

Post-mortem Notes.—22/3/13: Child's appearance about seven years of age. Emaciated, rather dolichocephalic. Contractures of upper and lower extremities. Right heart dilated. Mitral valve somewhat sclerosed, yet functionable. Spleen small, and had what was taken to be an infarct in the lower pole. Unfortunately, the spleen was put back in the body, and so lost to microscopical examination. This I regret very much, as the supposed infarct was possibly a growth like those in the kidneys. Old pleural adhesions to left lung. The visceral pleura of both lungs was white and thickened. There was broncho-pneumonia of both lungs. The liver was tough. The mesenteric glands slightly enlarged, but not caseous. Both kidneys were tough and pale, with creamy-coloured growths in the cortex. The cortex was also cystic, and chronic fibrotic changes were present. The dura was thickened, the pia arachnoid was oedematous and blood-stained from ecchymosis. The cortex was irregularly indurated. The floors of the lateral ventricles have the candle-guttering appearance, as in the former case. The cerebellum was normal.

Cause of Death.—Broncho-pneumonia.

Weights of Organs.—Brain, 41 oz.; spleen, 2½ oz.; L. kidney, 2 oz.; R. kidney, 2 oz.; liver, 21 oz.; heart, 3½ oz.; R. lung, 12 oz.; L. lung, 11 oz.

Case (3).—A. R. Received, 17/11/04.

This case was a patient at the Idiot Cottages, and died in 1911. Dr. Mackeddie made the post-mortem, and I have no doubt that the condition was the same as the two cases already described.

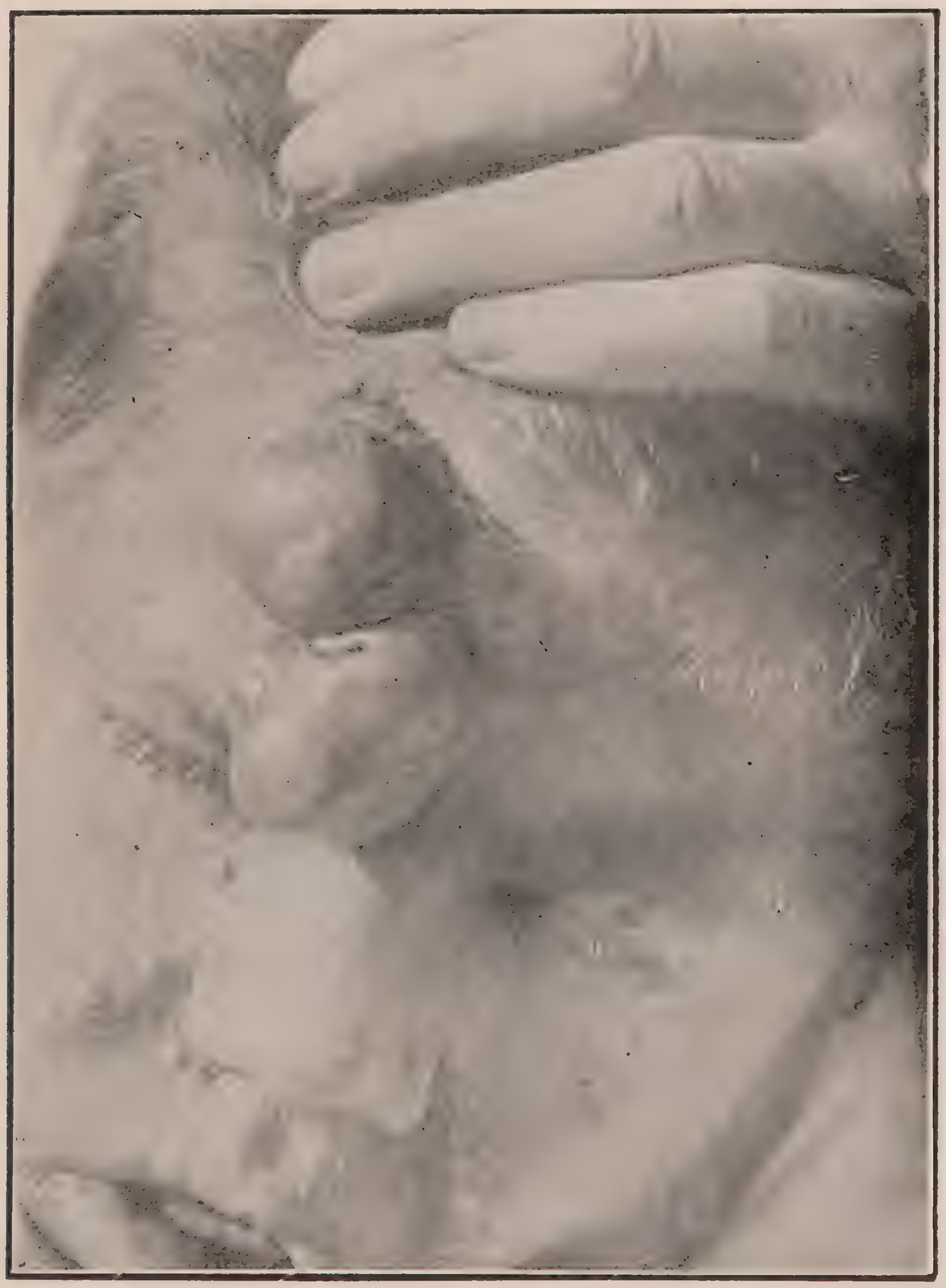
Notes on Reception—Nineteen years of age. Can walk alone and can run alone. Perfect movement of upper limbs. No fits. Feeds herself with spoon. Good health. Cannot read, cannot write. Dirty at times. Not destructive. Idiot since birth (? genetous type). Was in asylum in 1892, and allowed on trial.

30/3/06: Face covered with adenoma sebaceum; otherwise good health.

11/8/07: Large lump on side of neck (? tubercular gland).
13/8/11: Hyperpyrexia and cyanosis.
15/81/1: Died.

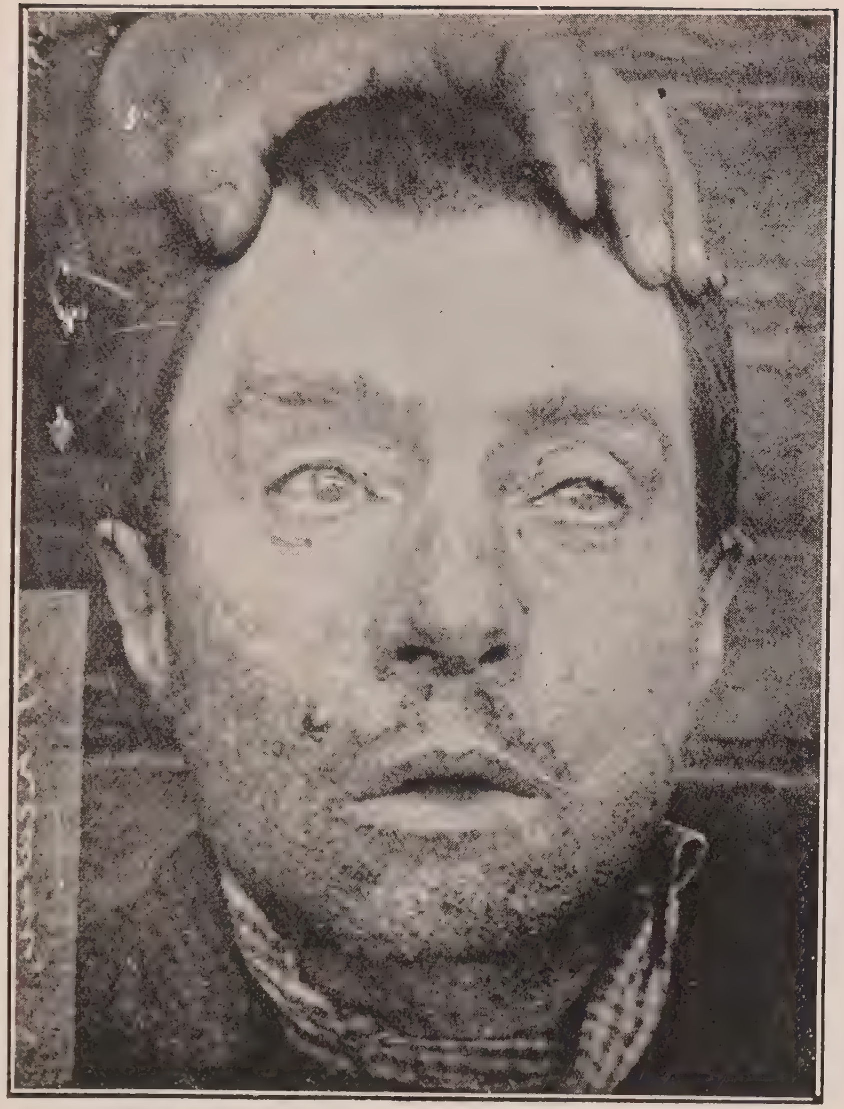
I tried to trace the friends of this patient, but my letters were returned from the dead-letter office.

Post-mortem Notes.—Aged twenty-five. Lungs clear. Liver fatty and friable. Heart shows a small aorta. Dilated right heart. Mitral valve admits only one finger. Brain studded throughout with sclerosed



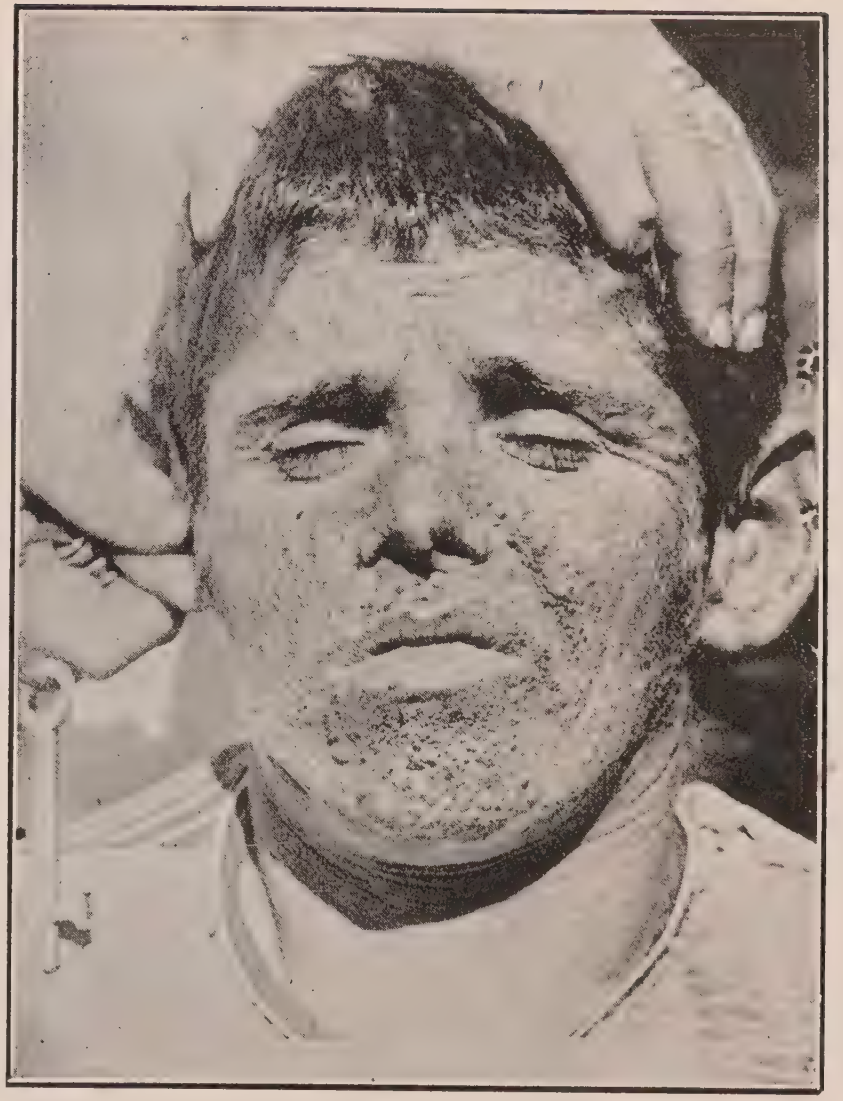
M. E. B.

ADENOMA SEBACEUM, SHOWING THE LARGE LESION ON THE FOREHEAD.



R. L.

Adenoma Sebaceum, showing distribution of Lesions.



N. A.

Case 6, showing the Adenoma Sebaceum.

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areas. Small nodules in both kidneys, very irregular in contour. Kidneys present a sarcomatous appearance.

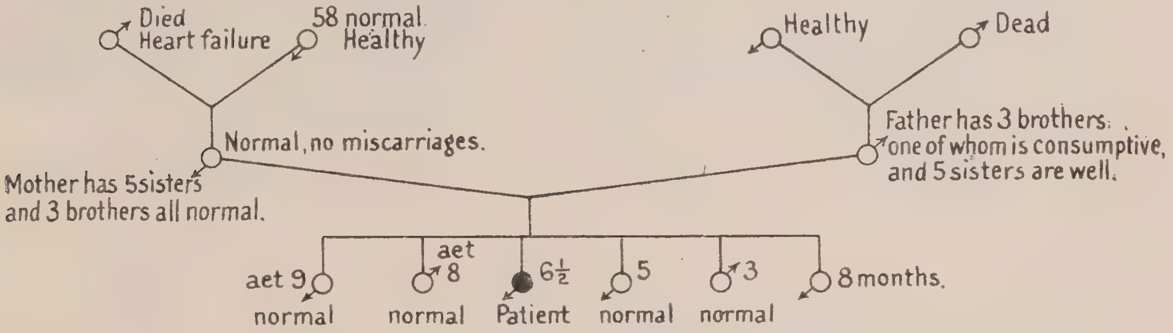
Weights of Organs.—Pons and cerebellum, 6 oz.; R. hemisphere, 19 oz.; L. hemisphere, 19½ oz.; heart, 10½ oz.; R. lung, 22 oz.; L. lung, 21½ oz.; liver, 48 oz.; R. kidney, 10½ oz.; L. kidney, 6½ oz.; spleen, 4½ oz.

The next case is one which I saw at the Alfred Hospital, where she was attending Dr. Crowley's clinic on skin-diseases, and I am much indebted to Dr. Crowley for giving me the opportunity of examining this patient from a mental standpoint.

Case (4). Little Girl, J., Aged Six Years and a Half.

Attending Dr. Crowley for adenoma sebaceum. High arched palate. Is backward, but by no means idiot. Cannot spell as well as her younger sister. She has adenoma sebaceum on the face and head, and fibromata on the flanks. The bridge of the nose is flat, and she seems stuffy as in post-nasal troubles. Otherwise her health and condition are good. The mother has moles on the body.

Heredity Chart.—



The next case is a patient at the Idiot Cottages. Kew,

Case (5).—R. L., Male. Received, 3/11/02. Aged Twenty-eight.

Notes on Reception.—Feeble sight, indifferent hearing. Can walk and run alone. Perfect use of upper extremities. Epileptic; destructive. Has adenoma sebaceum on face only. Is dull, not very clean in habits. Works in garden a little.

12/5/13: Dull and resistive. Looks about seventeen years of age. Has the huddled-up appearance of the chronic epileptic. Has commencing contractures of upper extremities. Resists examination for palpating the kidneys.

I could obtain no further information about this case, owing to inability to trace the friends or relatives.

Case (6).—N. A. Received into the Idiot Cottage, Kew, on 31st July, 1895. Age not stated.

Notes on Reception.—Hearing imperfect. Cannot speak. Walks alone, runs alone. Imperfect power of the upper limbs. Has epileptic attacks. Dirty habits. Condition has existed since birth. Cause not known to relatives.

Has adenoma sebaceum on face. A photograph of the patient is attached, giving some idea of her present condition, perhaps better than any description.

The friends of this patient cannot be traced.

The next case is the most interesting from the skin point of view, as Dr. Crowley, who kindly saw this case for me, says that the size of the growths is unique. I had had doubts about the large parts of the growth on the forehead on account of its size, but Dr. Crowley assures me that it is undoubtedly adenoma sebaceum, but larger than any he has ever seen or read about. I attach the photograph.

Case (7).—M. E. B., Female. Idiot Cottage, Kew. Received, 17/12/1900.

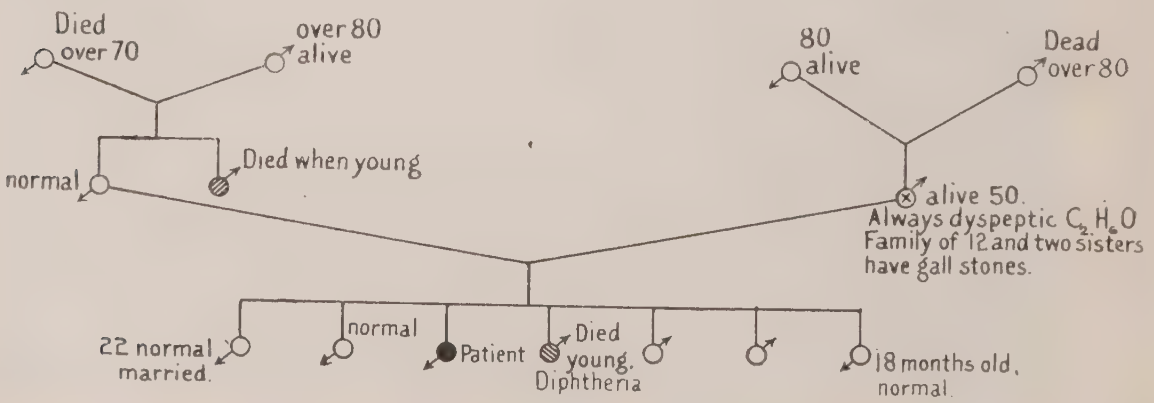
Notes on Admission.—Six years of age. Walks alone, runs a little. Paralysis of the left arm. Epileptic. Spoon-fed. Good health. Cannot read or write. Clean sometimes. Imbecile from birth. This case is also afflicted with Pringle's type (pink type) of adenoma sebaceum. Mark of old trephine on right side of vortex. Has no use of left arm, and very imperfect use of left leg.

7/5/1901: Epileptic fits. General health good. Has adenoma sebaceum of face, and a very large growth, as before mentioned, on the forehead. Is contracted in all limbs, and sits curled up in a large chair.

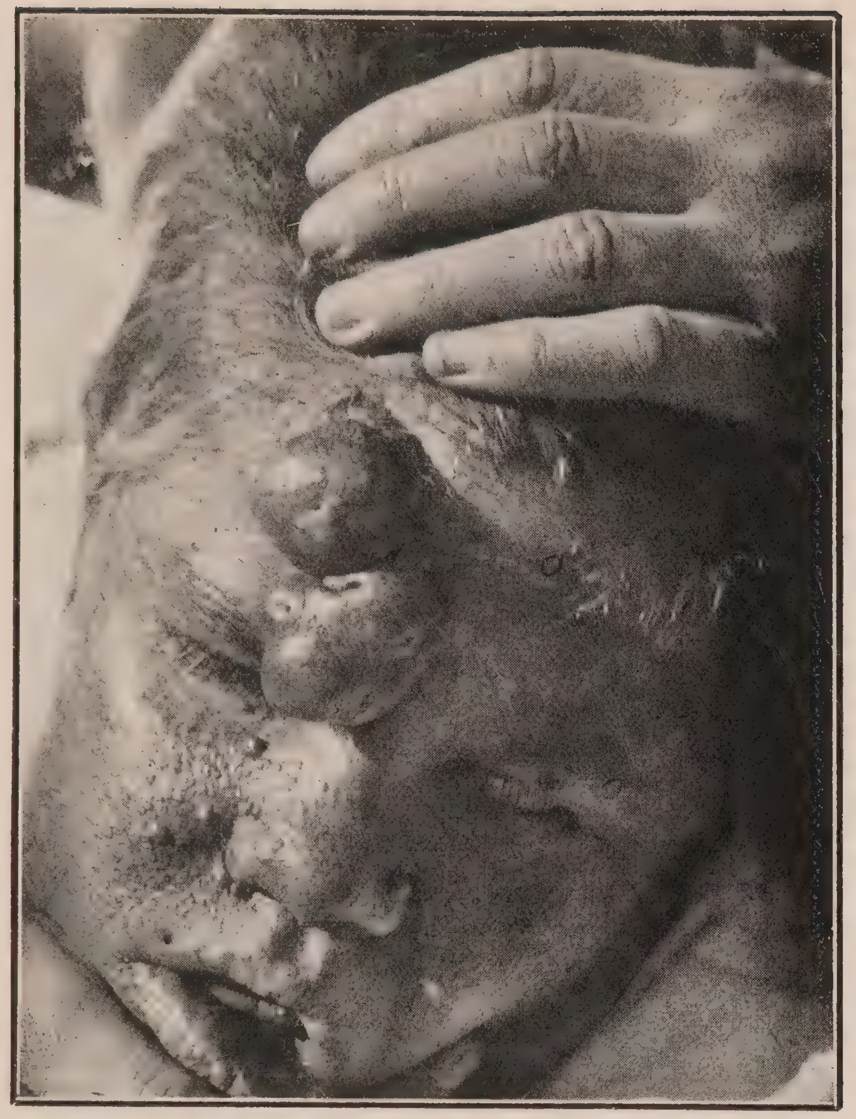
Family History.—The mother says that the patient had a fall when nine months old. Two days afterwards she had convulsions, and has had other attacks since. I think we can discount trauma as the cause of the fits, as we all know how every "head" trouble is always put down to a fall. In the case of epileptics at the Ewell Colony only 0·75 per cent. of the cases are actually due to trauma, although the friends gave 20 per cent. as being caused by injury (*vide Practitioner*, 1912, page 834).

The aunt's story is probably nearer the truth. The paternal aunt says that the mother of the child is a hard woman and "evil-spoken." The mother received two shocks during pregnancy (we cannot get away from maternal impressions when dealing with friends of patients). The first shock was a fight between her husband and father, and the second was seeing her husband shot (accidentally wounded) by a gun accident. The father of the patient was alcoholic all his life. The aunt first noticed the baby was continually crying, and could not be managed as other babies. Later on it could not be controlled, and used to run out into the street. At five years of age it took fits, and had very little trace of rash on its face. It was trephined at the Melbourne Hospital at five years of age to try and relieve the fits.

Hereditary Chart.—



I removed a piece of rash from this patient's chin for microscopical examination.



M. E. B.
ADENOMA SEBACEUM, SHOWING DIFFERENT VIEW OF RASH.

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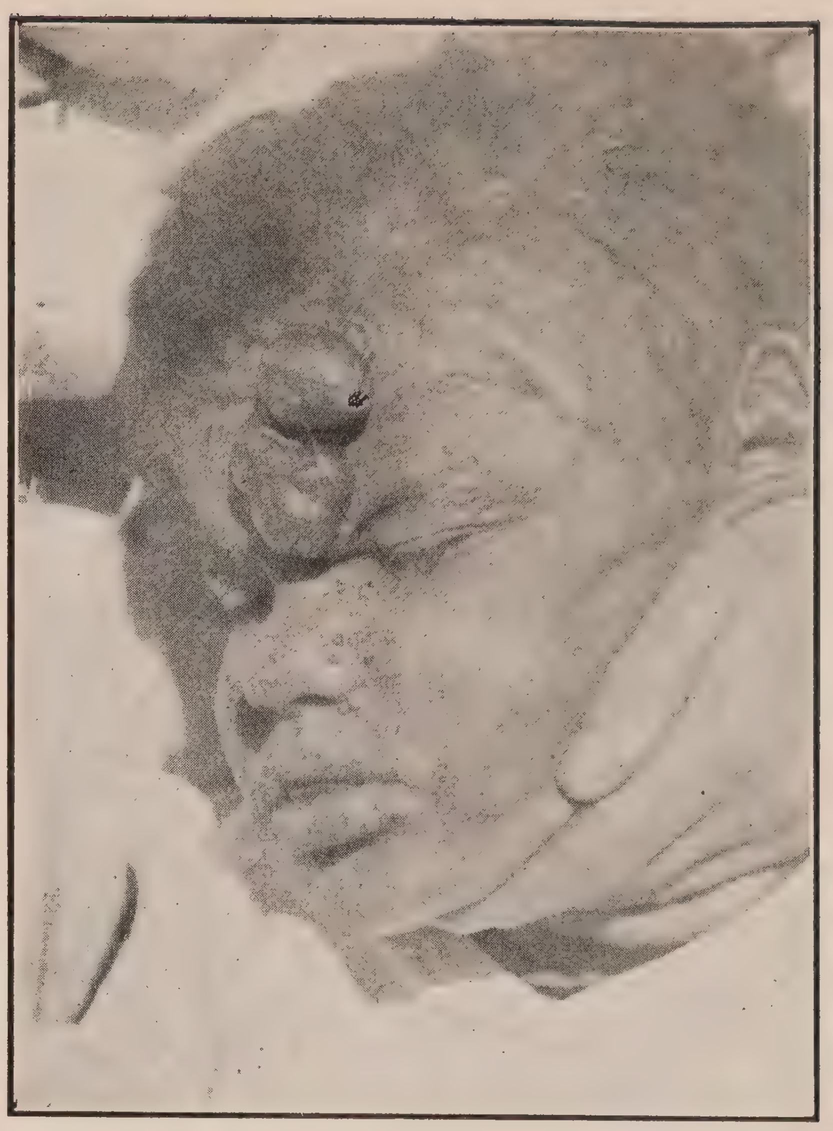
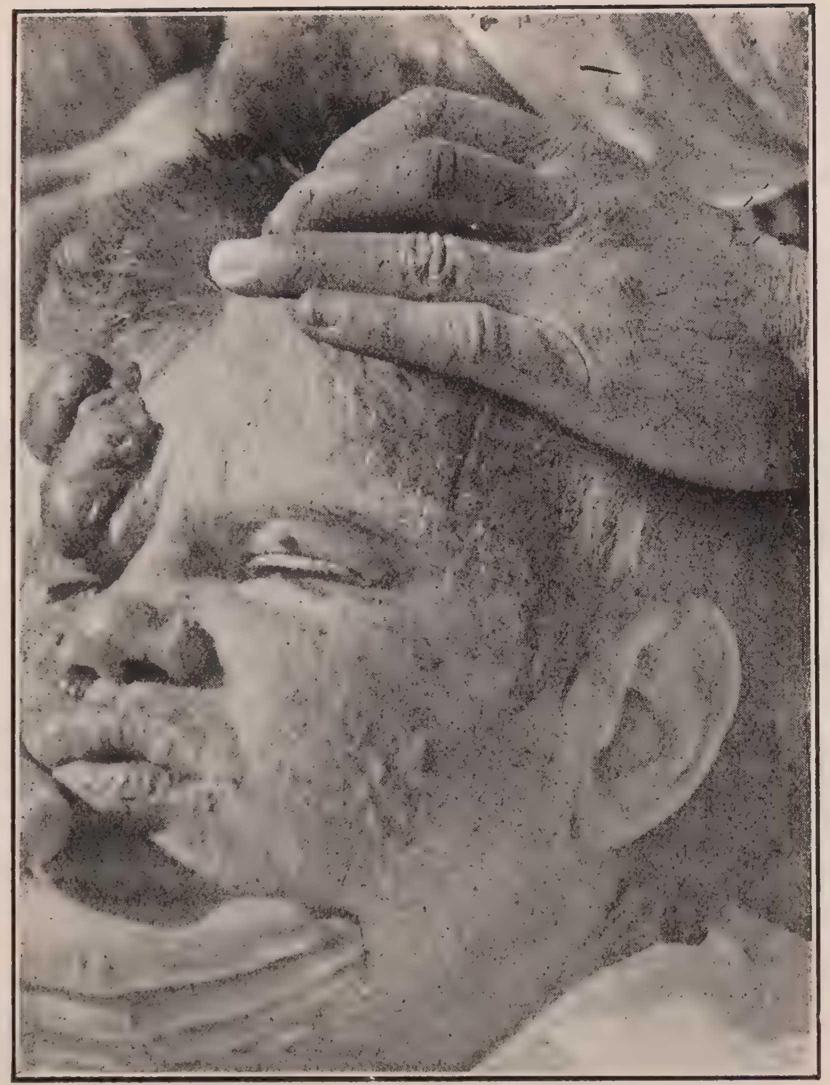
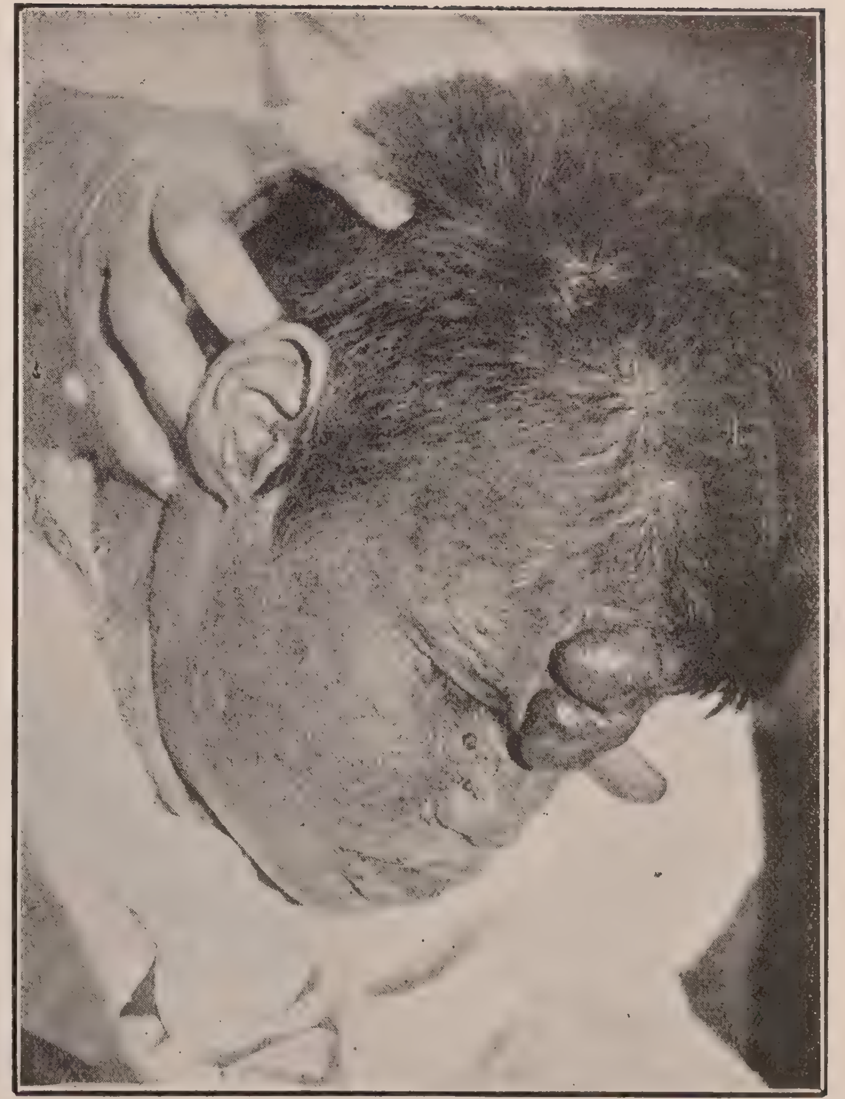


M. E. B.
ANOTHER VIEW OF LESIONS.

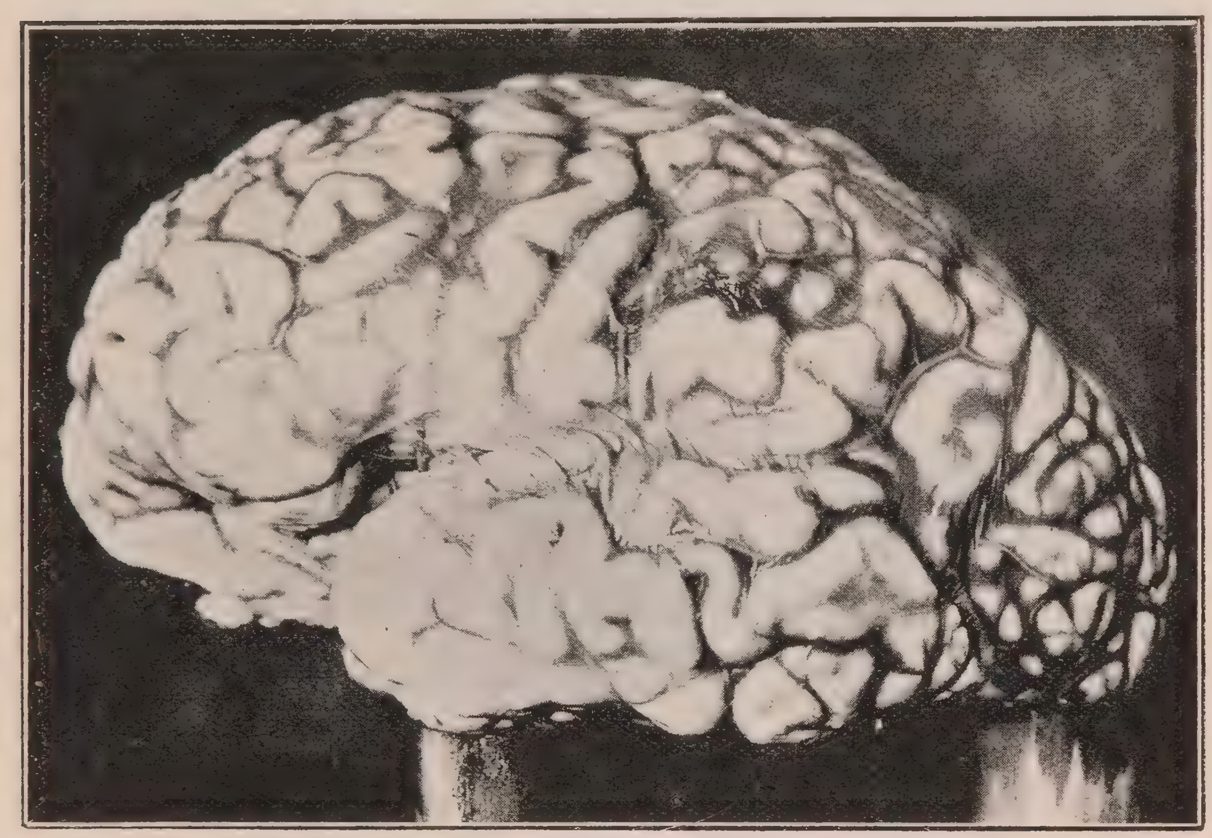


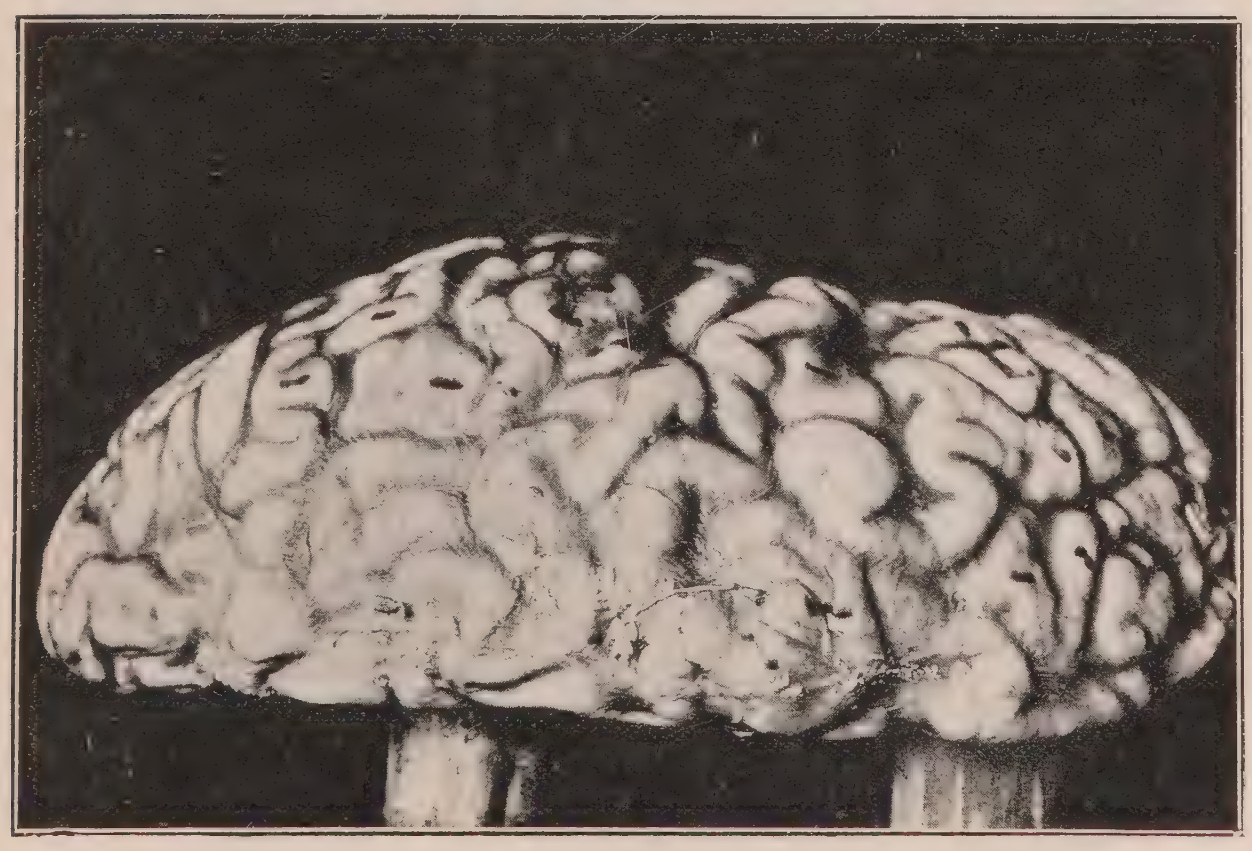
M. E. B.
Adenoma Sebaceum.



M. E. B.
Adenoma Sebaceum. Another View of the Condition.

Photo of R. J. H. Left Hemisphere after hardening in 5-per-cent. Formal, showing Irregularity of Surface of Affected Areas, with Bulkier Appearance and Operculation of Adjacent Gyri.





Parts marked with pencil were hard.

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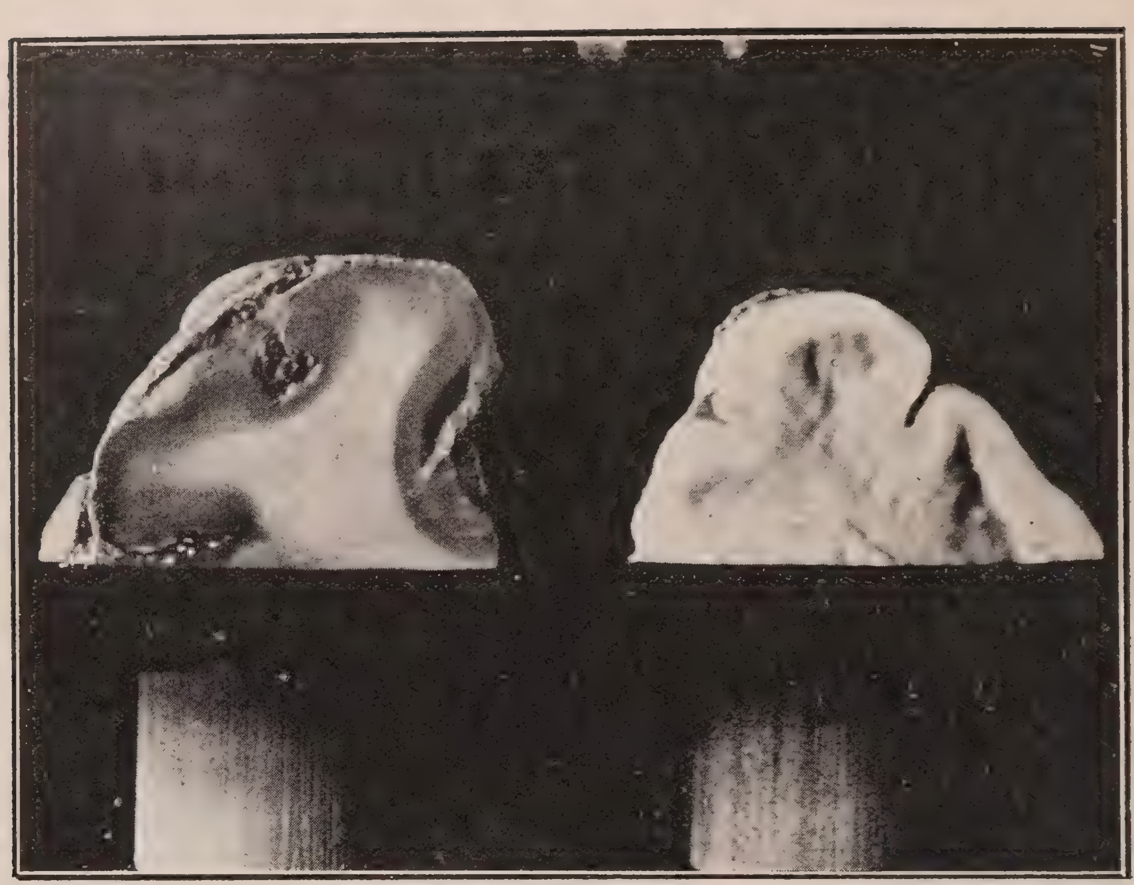
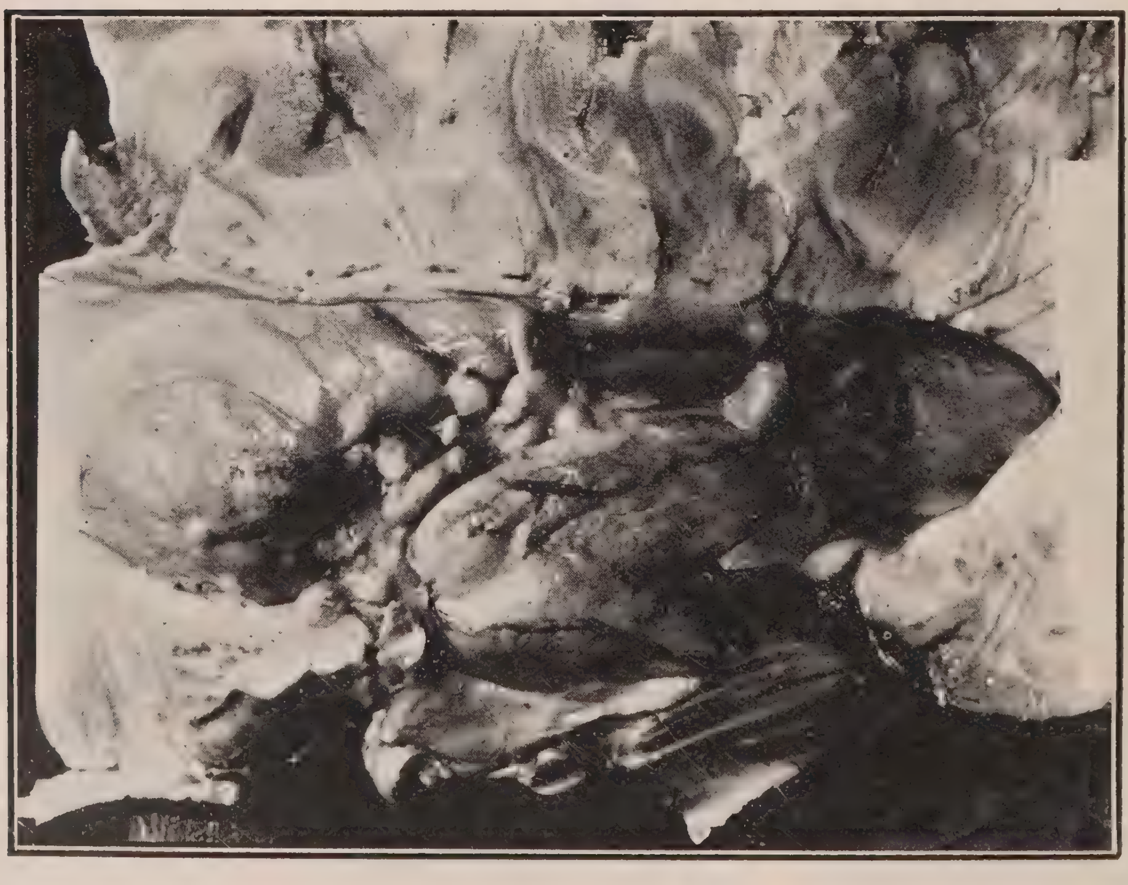
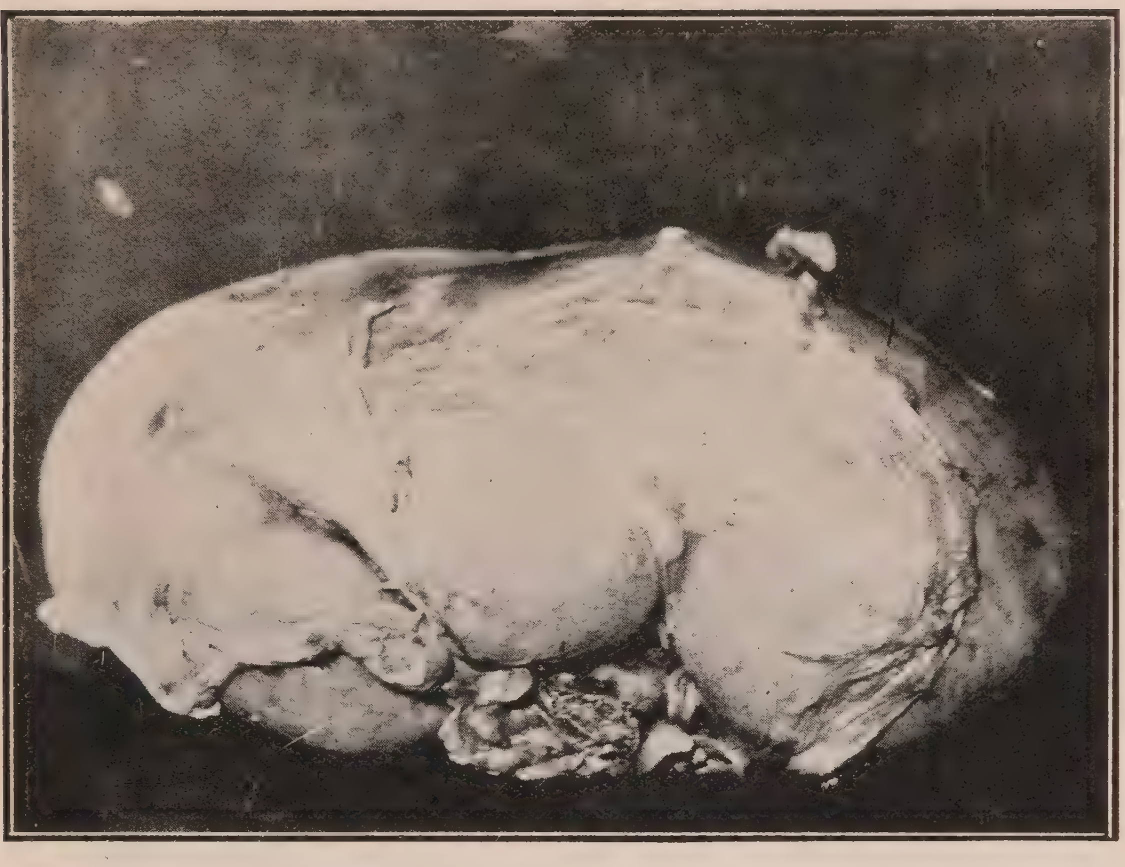


3. Piece of Convolution of Diseased Condition, compared with Normal.

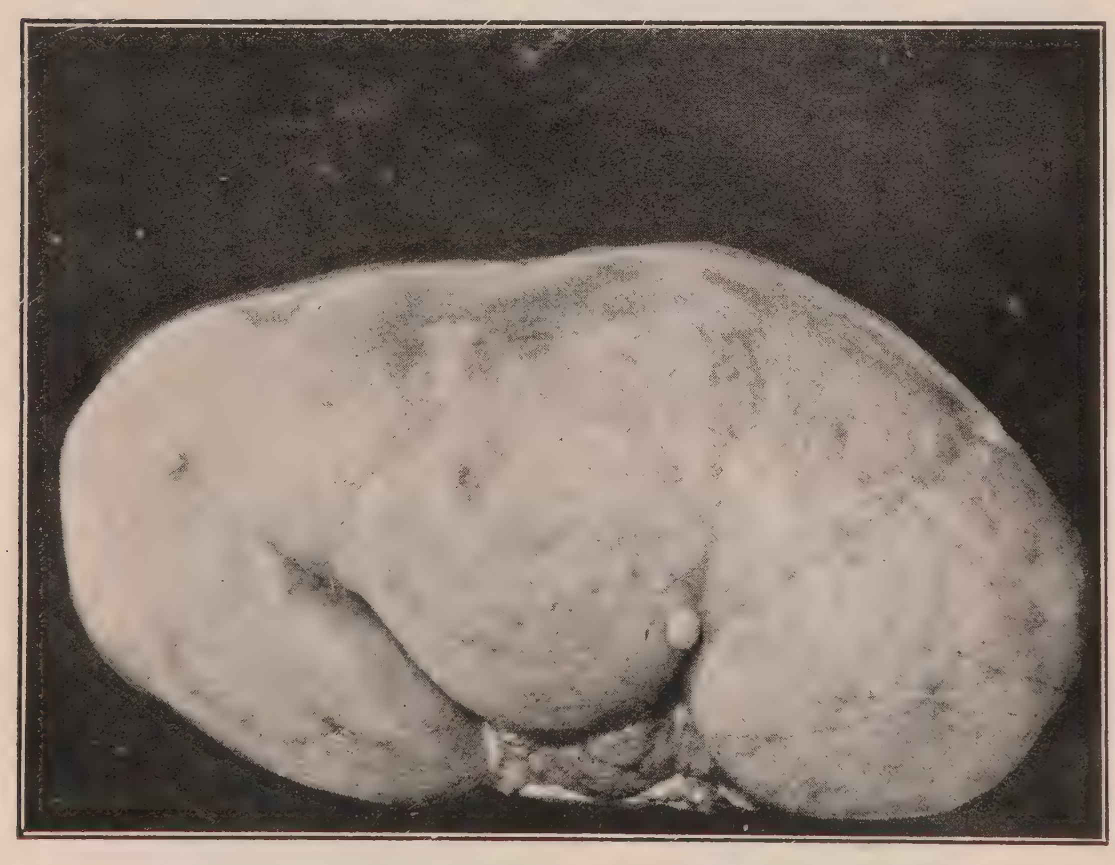
The normal shows the grey on the outside, while the hypertrophic sclerosis shows the cortex white and the medulla a greyish tinge.



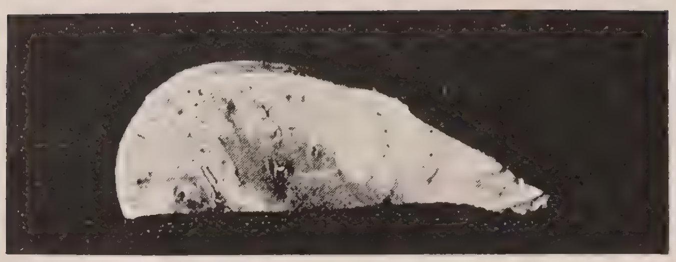
4. Showing the Surface of the Optic Thalamus and Caudate Nucleus, with the Keloid Appearance mainly following the Course of the Corpus Striatum Vein.



5. Showing the Kidney unstripped, and one of the Growths below the Pencil-mark X.

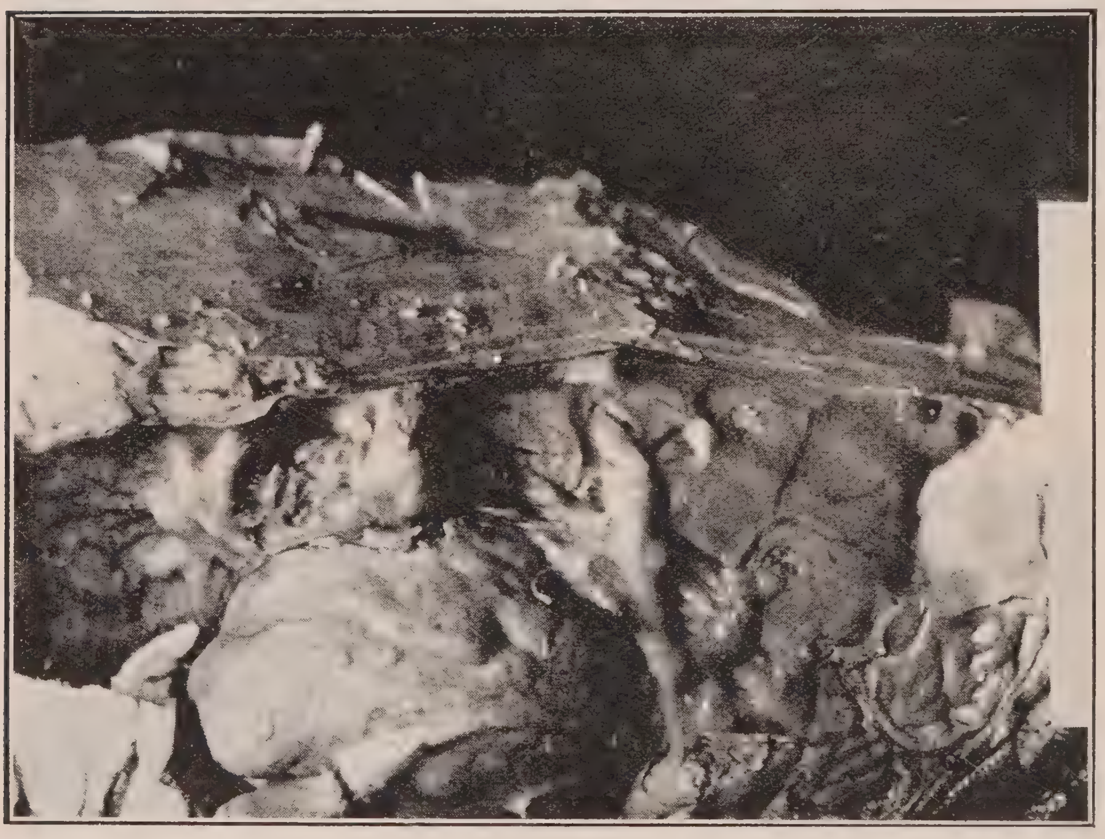


6. Same Kidney Stripped. This Case showed Chronic Fibrolic Changes as well, and gave a Wassermann Position.

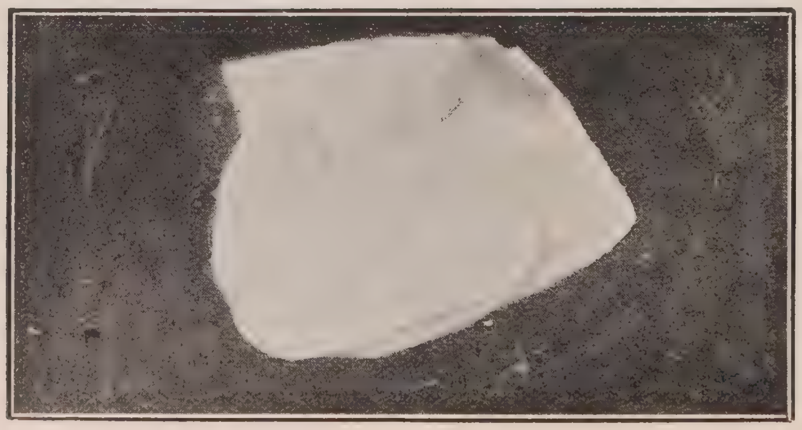


7. Small Section of Kidney, showing Cross-section of Secondary Growth in Cortex.

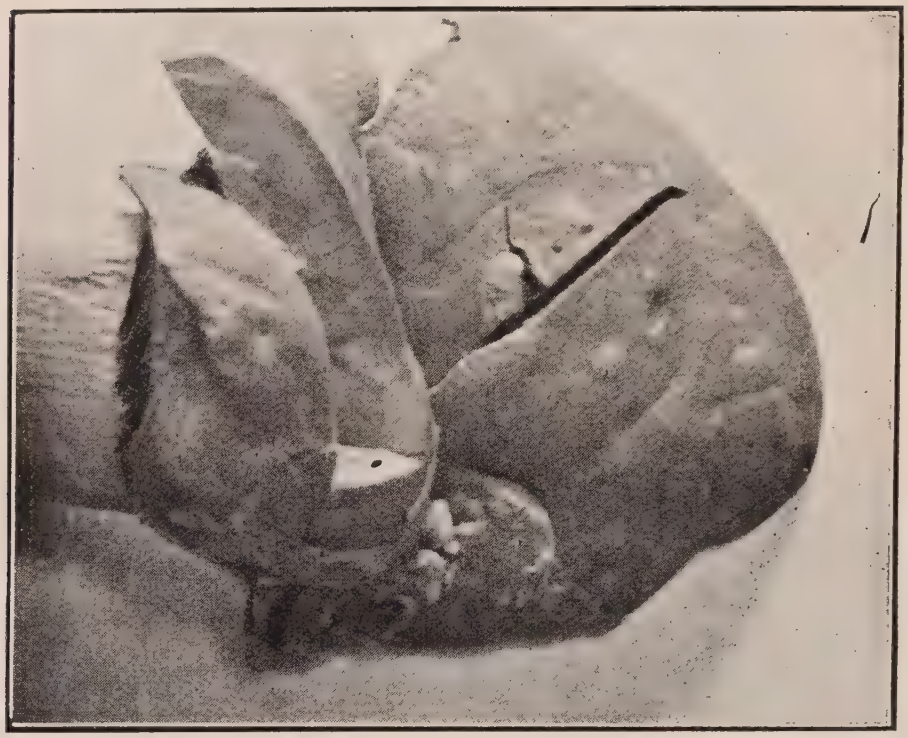
Showing the growth slightly raised above the surface, and round contour limited to the cortex, and, although not encapsuled, still quite distinct from the kroxy substance.



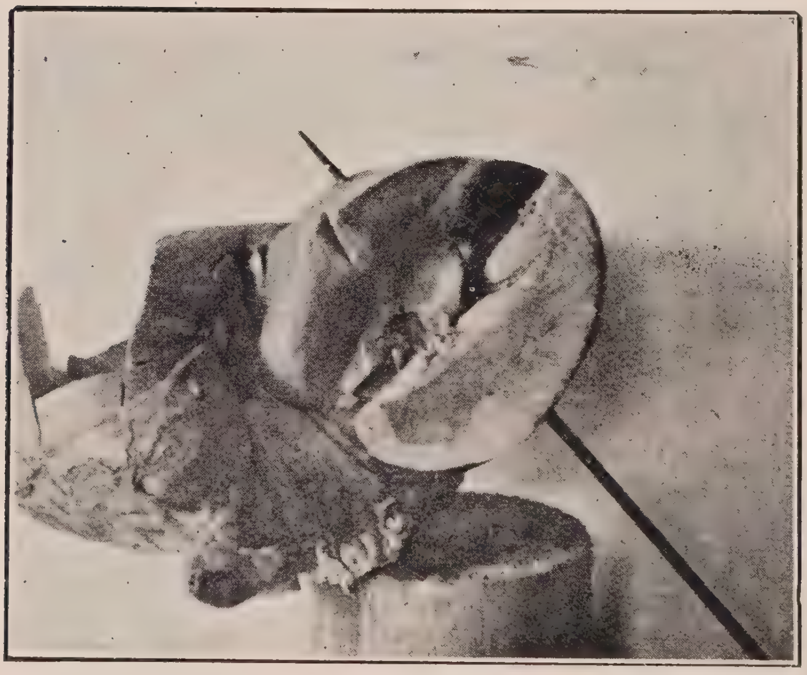
8. The Surface of Optic Thalamus and Caudate Nucleus in Case 2.



One of the Convolutions cut across, showing the Denser Cortex and broadening of the Summit.



Kidney of Case 2, showing Growths in Cortex.



Showing Growth in Cortex of Case 2.

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EXAMINATION OF THE AFFECTED ORGANS.

The post-mortem findings in the two cases I examined myself were practically identical in regard to the appearance of the brain and kidneys.

The first thing unusual about the case was noticed when the dura mater had been reflected, and when the left hand was placed on the frontal pole to ease up the forepart of the brain and enable the optic nerves to be severed. The brain felt irregularly hardened, although the first appearance had not prepared one for any departure from the ordinary. The convolutions felt as if some were made of hard paraffin, and the others were of the usual softness of brain-tissue. The distribution of the hard parts was not regular, either in regard to the opposite hemisphere or to the gyri affected.

There seemed to be no selection of motor, sensory, frontal, tempero-sphenoidal, or any special area whatever. The condition, however, seemed restricted to the cerebrum, as the cerebellum and mid-brain had no hardened areas.

On making a section with the brain knife across one of the diseased areas one was struck by the density and whiteness of the cortex, and the dirty appearance of the medulla of that area as compared with the normal, so that the colouring appeared the reverse of the usual grey and white distinction between the cortex and the medulla.

(In passing, I might say that the so-called grey colour of the cortex very rarely appears grey, but varies between drab and salmon colour. That is the conclusion I have come to through routine matching and recording of the cortical colour of every post-mortem made at Yarra Bend and Kew Hospitals for Insane.) This shows up more markedly in a specimen that has been preserved in formalin for a week or so, as is demonstrated in the accompanying photograph. On closer inspection of the surface of the gyri the affected portions appear whiter and puckered, and not so rounded in contour as the normal. The convolution has also a bulkier appearance, so that it has a tendency to operculate adjacent unaffected gyri.

On opening the lateral ventricles the next abnormality appears on the upper surface of the corpus striatum and optic thalamus. The condition seems to be most intense along the course of the corpus striatum vein as it traverses the surface between the caudate nucleus and the optic thalamus.

The appearances of the changes here are like the hypertrophic keloid scar one sees frequently following burns.

The floors of the ventricles are irregularly raised into small tubercles of varying sizes. To the touch they are harder than the surrounding parts. The photographs give an idea of their appearance and position.

The changes in the kidneys were the next departure from the ordinary. They were noticed before the capsule was stripped, and before any section was made into the substance. On the surface could be seen cream-coloured tubercles, rounded and varying in size from 2 to 7 mm. across. The majority were slightly raised above the surface, but a few were about level with the surface, and an occasional one or two were slightly depressed, as in old-standing infarcts. They were irregularly distributed, and were discrete. On making a section through the kidney the growths were seen to be confined to the cortical region, and all reaching the surface. They were quite distinct from the kidney-substance, but did not appear to have any capsule, and they all assumed a tendency to roundness of border.

In the case of R. J. H. there was a growth in the spleen, but it was unfortunately regarded at the time as an infarct, and not kept for microscopical examination. In colour and shape it was similar to the changes in the kidney. I notice that Campbell records similar growths in the lungs, which he took for resolving infarcts, but with nothing to account for them, and he evidently did not section them, and says that the diagnosis of infarct may have been at fault.

MICROSCOPICAL EXAMINATION OF THE SECTIONS.

Cerebral Cortex.

(*a.*) *Cellular Elements.*—In the cortex the first departure from the normal appearance is in the increase in the number of cells in the zonal area. The fusiform cells of Cajal can still be detected, although considerably obscured by numerous faintly stained cells of irregularly rounded shape, which give off very short and fine processes in every direction. They do not stain like neuroglia cells, and it is they that give the appearance of the increased cellular elements to this region.

All along the free pial edge of the sections there are, at intervals, certain indications of ingrowths from the pial tissue. Campbell describes these as being of glandular nature, and being tubular down-growths lined by columnar epithelium, and having islet cells of Langerhans in the lumen. In the case at Kew I could not make out such an arrangement, the invasions into the cortex being lined by a layer of cells similar to those lining the perivascular spaces of the cortical vessels. In fact, the sections show what appears to be a somewhat exaggerated condition of the normal attachment of pia to cortex rather than a glandular structure.

In all the pyramidal cells, and especially in the small pyramidal layer, the normal cells seem much fewer than usual, and there is considerable chromatolysis present. The intensity of the cell-deterioration varies within wide limits, from simple diffuse staining to swelling of the nucleus and complete destruction of the cell. Dotted through the sections in both grey and white matter are larger cells, in size equalling the Betz cells of the motor area, but more-rounded in shape: most of them staining finely granular, with a faintly defined and, in the majority of them, eccentrically placed nucleus. These cells appear to have short and very fine processes. In all the parts of the sections is an excess of neuroglia cells and fibres, forming a fine interlacing background.

In the white matter, besides the small rounded nuclei, normal to this region, there appear deeply stained fusiform cells with clear nuclei. The long axis of these cells lies in the same plane as the corticipetal fibres, and at either pole taper off to a fine process.

(*b.*) *Fibres.*—In the fresh specimen it is impossible to distinguish the bands of Baillarger, the whole cortex, on section, appearing dense and white, almost like hyaline cartilage, and the white matter has taken on a bluish-grey tinge. There is practically no appearance of the tangential fibres on staining. This is not surprising, as these fibres are considered an index of the intellectual capacity of the individual.

Both the supra-radial and inter-radial feltwork of Edinger are poorly represented. As these are made up mostly from the dendrons of the pyramidal cells, which are suffering more or less from degeneration, the result is not unexpected.

Meynert's columns are ill-defined, and the radiations are poor in numbers.

(*c.*) *Changes in the Ventricles.*—On examining sections made through the growths in the floor of the ventricles it is seen that the ependymal layer is intact, and under this is a collection of neuroglia cells in a dense feltwork. Further in from the feltwork is a confused collection of cells, corpora amylacea, and haemorrhage. The cells which can be picked out in this collection of corpora amylacea, &c., are like fibroblasts in structure. Dotted through the section are round cells like those described in the cortex, and having the appearance of a rounded Betz cell with fine granules.

(*d.*) In the *kidney* the appearance of the growths is that of a network, like lipomatous tissue, with some of the meshes packed tightly with spindle and round cells. No blood-vessel can be detected in the tumour-tissue, but in the parts nearest the kidney-substance an occasional duct formation can be observed. In this part can also be detected fibrous tissue-cells and the remains of Malpighian tufts. There is no capsule, the growth being apparently of kidney-substance undergoing some variety of lipomatous change. Campbell describes the growth as containing no renal structure, but containing numerous vessels, with many showing thickening of the adventitia.

(*e.*) In the *skin* sections made from the adenoma sebaceum case—M. E. B.—there was hypertrophy of the sebaceous glands and of the rudimentary hair-follicles, the latter being most marked. There were large blood-vessels with lining membrane only, muscle and fibrous tissue being absent from their walls.

THEORIES OF ETIOLOGY.

Campbell says that the morbid process must be active during intra-uterine life, although not before the seventh month, because during that month the plan of the sulci and gyri is laid down. In tuberose sclerosis, in spite of the masses of fibrous material all over the brain, there is no disturbance of external morphology. He considers that the condition is developed from the lining-cells of veins, and that the disease is the outcome of some evolutionary aberration or disturbance arising during the last few months of foetal life affecting the endothelium of blood-vessels and lymphatics, and resulting in the form of structural hyperplasia and heterotopism in the organ affected.

It is undetermined whether the kidney is derived from epiblast, hypoblast, or mesoblast. Fürstner and Stuhlinger say it is a leptomeningitis, arising in intra-uterine life or early youth, causing a gliosis of a chronic nature. This does not account for other somatic changes. Koch regarded it as being traumatic in origin. Scarpatetti says it is due to syphilis in the parent, as a result of which multiple haemorrhages affect the brain of the offspring at an important period of intra-uterine development, and call forth an extremely chronic form of reactive inflammation. This also does not explain the somatic changes, and syphilis as a cause has yet to be proved. Geitlin says that the kidney-tumours are allied to those which appear in the lateral ventricles. Vogt thinks it is an error in development, and is supported in this view by Geitlin and Montet. Bourneville does not mention adenoma sebaceum in his cases, neither does Bonfigli. Sherlock says, " It will be seen that there is nothing in the above descriptions to justify the separation of tuberose sclerosis as a clinical entity" ; and writing in the *Twentieth Century Practice,* P. Sellier says that " while atrophic sclerosis may be diagnosed in a certain number of cases, the recognition of the hypertrophic form is, in my opinion, impossible, not only because it has no characteristic symptoms, but also because, being such a rare condition, we are seldom led to think of it at all." Later on Sherlock says that " probably some of the cases may be diagnosed by the coexistence of cerebral, renal, and skin condition." He suggests that there may be more than one form of tuberose sclerosis. In all of the cases cited in this paper the type of adenoma sebaceum has been the Pringle type. I very much regret that I am unable to attach to this paper microphotographs of the sections made from these cases, as the laboratory does not yet possess the appliances necessary for their production.

Careful examination into the family history and cases reveals practically nothing of any value in determining the etiology of this disease. The various theories advanced do not seem to be very convincing, and yet it is astonishing to find that the brains and kidneys of two cases should be so similar, while there does not seem to be any common factor in the histories of those suffering from the disease that might throw a little light on the subject. I feel more hopeful than Sherlock, who says that there is nothing to justify the separation of tuberose sclerosis as a clinical entity, and I do not agree with P. Sollier when he says that the condition cannot be diagnosed.

With the three symptoms, adenoma sebaceum, epileptic fits, mental deficiency dating from birth, and muscular contractions coming on much earlier than in ordinary epileptics, I consider the diagnosis should not be difficult.

Gentlemen, I hope that the description of these cases will interest you sufficiently to justify the length of time I have occupied your attention.

REFERENCES.

1. Bourneville. " Archives de Neurologie." 1880.
2. A. W. Campbell. " Cerebral Sclerosis : Brain." February, 1906.
3. M. B. Dobson. " A Case of Epileptic Idiocy associated with Tuberose Sclerosis of the Brain." *Lancet,* 8th December, 1906.
4. J. S. Fowler and W. C. E. Dickson. " Tuberose Sclerosis," in the Proc. Edin. Med. Chir. Soc., and *Lancet,* 14th May, 1910, p. 1351.
5. Sherlock. " The Feeble-minded."
6. Osler. " Text-book of Medicine."
7. " Medical Annual," 1912. (Beaugard.)
8. *Medical Press.* 5th May, 1909. (Murrell.)
9. Thos. B. Hyslop, M.D. *Journal of Mental Science,* January, 1900.
10. Bourneville. " Progress Medicale," 1896, p. 129 ; and Arch. de Neurologie, July, 1900.
11. Fürstner and Stuhlinger. Arch. für Psych. band 17, p. 1.
12. Hartdegen, Arch. f. Psychiatrie, band ii, p. 117.
13. Bourneville et Bonnaire. Bull. de la Soc. Anar., 1881, p. 180.
14. Koch Neurol. Central-blat, 1887, No. 3.
15. Neurath Arbeiten aus Prof. Obersteiners Labor., 1899, heft. 4.
16. Sailer. *Journal of Mental and Nervous Diseases,* 1898, vol. xxv, p. 402.
17. V. Scarpatetti. Archiv. F. Psychiatrie, band 30, 1898.

A FEW INTERESTING CLINICAL CASES.

By Morris F. H. Gamble,

Medical Superintendent, Hospital for Insane, Kew, Victoria.

Mr. President and gentlemen,—I propose in this paper to deal with infantilism, Huntington's chorea, general paralysis of the insane in a woman of twenty-three years, and paranoia: examples of which conditions have come under my notice during the past twelve months in the Hospital for Insane, Kew. In order to gloss the crudity of my drawing of the clinical pictures of the several cases, may I be permitted to describe briefly the various diseases before giving the notes.

Infantilism.

The term "infantilism" should be limited in its application to those cases of dwarfism in which the sexual development remains infantile. Cretinism, achondroplasia, and Mongolian idiocy should not be embraced under the term. It is a form of defective development characterized by the persistence of the physical characters of childhood in one who has reached or passed puberty. The arrest of development physically and sexually is generally accompanied by a corresponding degree of mental backwardness, so that the individual remains a child in mind as well as in body.

Dwarfing of the body may be due to a variety of causes, such as defective or arrested thyroid secretion (producing cretinism), defective or arrested pancreatis secretion (producing pancreatic infantilism), congenital syphillis, tuberculosis, chronic diarrhoea unassociated with defective pancreatic function. Again changes—hypoplasia or atrophic—in the supra-renal bodies have been found in association with sex abnormalities in children; likewise morbid changes in the pineal gland are found to cause defective bodily and sexual development. Cases are recorded of precocious sexual development where marked pathological changes were discovered in that gland.

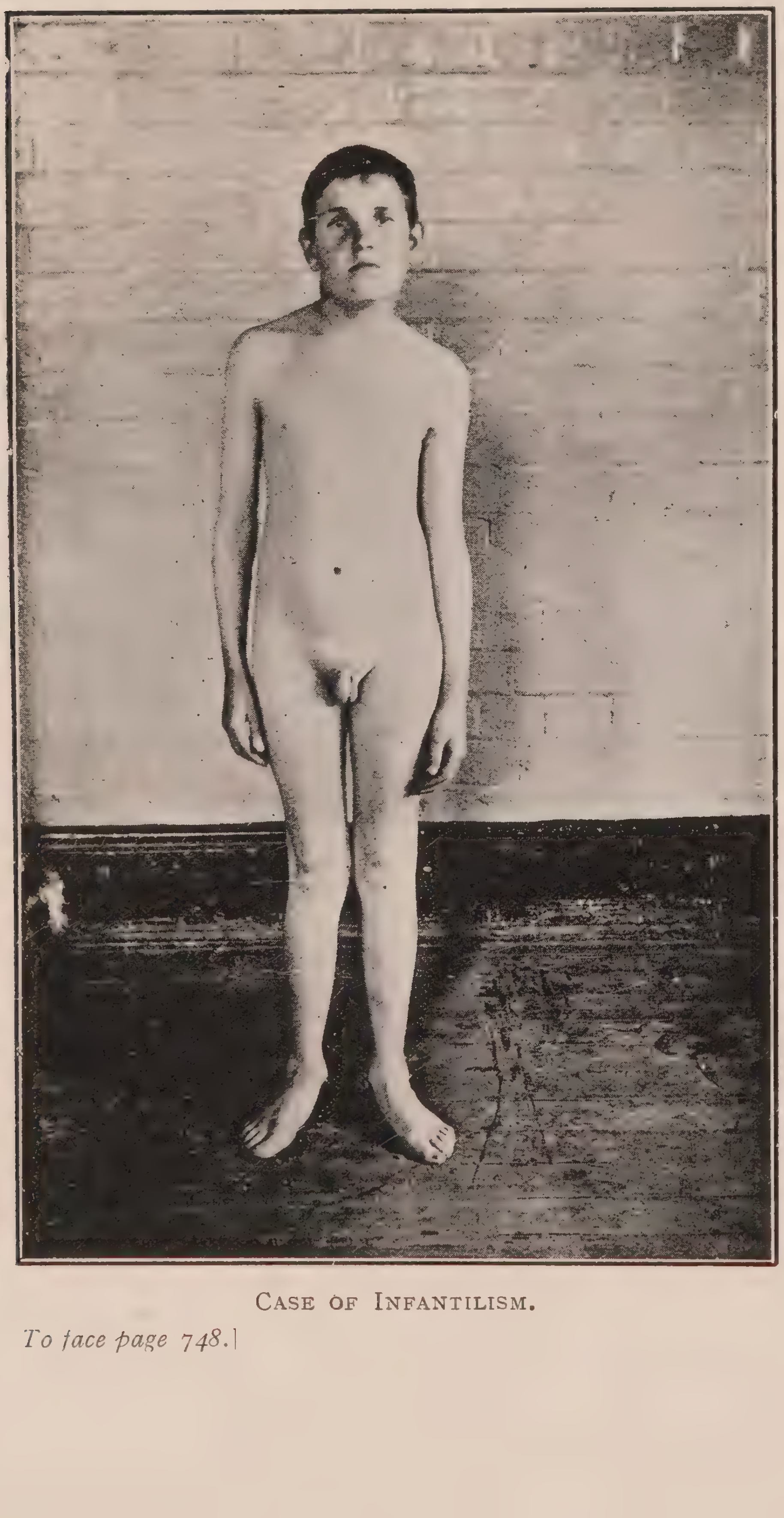
There is now a considerable amount of evidence indicating a correlation between sexual development and the various ductless glands. Defective thyroid secretion is often found associated with infantilism, but it is not by any means the only causative factor.

In the disease under consideration it is our object to try and determine the cause, for it is only when the cause in any particular case is ascertained that one can treat the patient rationally, or hope to cure the condition.

An important fact in connection with infantilism is that X-ray examination shows that the diaphyses and epiphyses of the long bones have remained ununited in very many cases, thus permitting subsequent growth, if the appropriate line of treatment has been adopted. Normally such a union takes place between the sixteenth and eighteenth years. Dr. Byrom Bramwell, in 1902, identified and exhibited a case of infantilism due to the defective action of the pancreas. This patient in 1902 was a young man of 18½ years, 4 ft. 4⅛ in. in height, and only weighed 4 st. 7½ lb. He looked like a boy of eleven. His bodily and sexual development had evidently been arrested at the age of ten. Just as in the case I am about to describe, he was well formed, the different parts of his body were all proportionate in size. Mentally he was bright and intelligent. My patient was intelligent, but he was not at all bright. Dr. Bramwell gave his patient 1 dr. doses of pancreatic extract thrice daily over an extended period, and the result was remarkable. In two years' time the patient had grown over 5 in., and his weight had increased by 24 lb., and his sexual development had progressed in a normal manner: he had become a man in fact.

The notes of my case of infantilism are as follow: Charles E. N., aged sixteen years, height 4 ft. 8 in., weight 5 st. 1½ lb., with an entire absence of any secondary sexual development, as is well seen in the accompanying full-length nude photograph. He was received into the Melbourne Hospital on the 28th April, 1913, with a history of having suffered for two years from attacks of dyspnoea with pain over the praecordium. On the 24th April, 1913, he had a "seizure," with loss of consciousness, followed by a feeling of asphyxiation; four days afterwards he was admitted to the hospital. Between the attacks he could take fairly vigorous exercise without distress. In 1909 his tonsils and some post-nasal growths were removed. As a child he had chorea, some growing-pains, but no definite history of rheumatic fever. On reception into hospital the temperature was normal, respirations 28, pulse 160, blood-pressure 108. The apex beat in the 5th space just outside the nipple-line, heart-sounds clear. Reflexes abnormally active. Scoliosis to right side in lumbar region. His pulse-rate remained high until he transferred to the receiving-house on the 17th May, 1913, on certificates which stated that he said the doctor and nurse poisoned him with a slow poison, and that he felt that he was dying from its effects—that he could not get his breath in consequence. Has a wild look at times, and is noisy, and beats the walls with his hands. He was sent to Kew Asylum on the 29th May, 1913. The family history is negative, save that his six surviving brothers and sisters are all said to be of nervous temperament, but otherwise quite normal. He was the last of a family of nine. His mother died at forty-two, from Bright's disease; his father, now fifty-nine, is said to be very delicate. The sixth and seventh children died in infancy, of marasmus. His blood gave a negative Wassermann reaction. He was always regarded as a backward boy, and did not learn well at school, reaching the third class at fourteen, when he left school and became a messenger-boy. He never indulged in boyish games, and was rather girl-like in character.

On reception into Kew Asylum he had the appearance of a boy of eleven, with a childish piping voice; he was hypochondriacal, apprehensive and tearful, saying constantly that he was going to die, had the delusion of having been poisoned, and craving for medicine to counteract the poison; constantly complaining of pains all over his body, of a burning sensation in his chest and abdomen, reiterating the statement that his chest fell in as a result of the poisoning; says that it takes away his breath, has auditory hallucinations in the form of "voices." There is a very considerable degree of hysteria in the psychosis of the case, and his exhibition of symptoms becomes exaggerated when any one is near him. His attention can usually be obtained, and he replies readily and rationally; but it is difficult to hold his attention, as he desires to revert to the recital of his various aches and pains



CASE OF INFANTILISM.

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and the supposed cause of them. Nothing suggestive of cretinism is evident, and there is no history of chronic diarrhoea, which, if present, would point to pancreatic inefficiency.

Soon after reception a course of Weir Mitchell was adopted and persevered with; he was also given, somewhat empirically I admit, pulv. pancreatin and supra-renal tabloids for about ten days, then thyroid tabloids were substituted. This treatment had a very beneficial effect on the mental symptoms, for by the end of June—*i.e.*, a month after coming to Kew—the lad had entirely recovered his normal mental health, and he left the institution on the 3rd July, promising to come back regularly as an out-patient for treatment of the infantilism, but this, unfortunately, he has failed to do. The question as to the pathological condition giving rise to the infantilism in this case I must leave unanswered.

Huntington's Chorea or Hereditary Progressive Chorea.

This is a rare disease, and its characteristics are: (1.) It is hereditary. (2.) It is a disease of adult life, developing between thirty and forty years of age; it may set in after forty, but never before thirty. (3.) It is progressive and incurable. (4.) There are always involuntary purposeless movements. (5.) It is accompanied with mental symptoms, a steady deterioration of the mental faculties leading to dementia.

Etiology.—The only known cause of the affection is its hereditary transmission from one generation to another. One or other parent is always similarly affected, and often several members of the same family exhibit the malady. There is no association between this disease and rheumatism, as we find in the ordinary chorea, and, further, ordinary chorea is limited to children. If hereditary chorea skips a generation it dies out, and is never reproduced in that family. It is a matter for further observation as to what relationship, if any, there is between inherited syphilis and this disease.

Morbid Anatomy.—There is found a marked resemblance in the changes in the brain of cases of Huntington's chorea to what is found in general paralysis of the insane—namely, thickening and adherence of the pia arachnoid, atrophic changes in the cortex and convolutions of the brain generally, with granulations in the ependyma of the 4th ventricle.

Symptoms.—The symptoms are both motor and mental. The former are the first to appear, and they resemble the involuntary and purposeless movements of ordinary chorea, though they are more inco-ordinate. Involuntary grimaces and gesticulations are common. Speech is much affected, being stammering, explosive, and indistinct. The gait is erratic, high-stepping, swaying, and unsteady, but these patients rarely fall. The choreic movements cease during sound sleep.

The mental or psychical symptoms are evidenced by undue irritability, by depression, with a peculiar tendency to suicide in some cases. There may be attacks of excitement, but a steady progress towards dementia is always present. The average duration of the disease is from ten to twenty years.

The history of my two cases of Huntington's chorea is as follows: Frances E. T., female, aged forty-three, married, with two children, one of whom suffers from chorea. She was received into Kew Asylum on the 25th March, 1913, on certificates which stated that she thinks people are trying to get rid of her and laughing at her. Is destructive, and generally uncontrollable. Talks much to herself, and resents interference. Apprehensive and self-neglectful. The duration of the attack was stated to be four years, and the choreic movements set in then. The family history shows that her mother was insane and choreic, and died at the age of fifty; her father died at the age of sixty, and was insane also, but not choreic. Two of her sisters and a brother exhibit symptoms of Huntington's chorea, one of the sisters being mentally deranged.

On reception into Kew she was excitable, resistive, unduly irritable, very restless, noisy, and destructive, and most difficult to control. Her memory seemed but little affected (it has become worse since). She understood what was said to her, and, so far as the very marked articulatory defect would permit of her being understood, her replies were rational, and she showed a lively, if not inquisitive, interest in the happenings of the ward. No delusions nor hallucinations could be elicited. The motor symptoms were well marked, the limbs and whole body being twisted and jerked involuntarily, and without cessation, the range of the inco-ordinate movements being very wide. The muscles of the face were also much affected with spasmodic twitchings, causing bizarre grimaces. All the reflexes, both superficial and deep, were greatly exaggerated. The pupils were equal, regular in outline, and their reactions were normal. Her speech was defective in the extreme, being hesitating and explosive, and to understand her was difficult. The gait was unsteady, the body swaying from side to side and backwards and forwards, and she walked like one intoxicated, with the feet held far apart. Romberg's sign was present. She was in poor bodily condition; nothing but mitral stenosis was found on physical examination. Her blood gave a partial Wassermann reaction. The patient's condition had not materially altered at the time of writing—namely, November, 1913.

The second case, which I mention merely to emphasize the hereditary factor, is that of a woman, Kate P., aged thirty-eight years, married, with six children. She became a patient in Kew in December, 1910, presenting precisely similar motor symptoms to those just described, but the mental symptoms were less pronounced. This patient's blood gave a negative Wassermann reaction. The family history showed that her father died insane, and was diagnosed as an epileptic; the post-mortem revealed definite evidence of syphilis. Her mother also died insane, and was choreic. An elder sister of the patient also suffered from Huntington's chorea, and died in an asylum, the cause of death being entered as general paralysis of the insane, after post-mortem.

The fact that this patient had a syphilitic father and that my first case gave a partial Wassermann reaction, when taken in conjunction with the striking resemblances between the post-mortem appearances of the Huntington's chorea brain and the general paralytic brain, tends to add some colour, I think, to the theory I have hazarded as to the role of syphilis in the production of hereditary progressive chorea.

General Paralysis of the Insane in a Woman of Twenty-three.

From an observation of the patients received in Kew Asylum during the past three years it would seem that general paralysis is becoming more frequent among the female insane than formerly. This increase may, however, be more apparent than real, for the introduction of the Wassermann test has undeniably enabled us to diagnose this disease with much great precision than in the days of the near past. However definite the clinical signs of general paralysis may be, I would hesitate to diagnose that disease in the absence of a positive Wassermann reaction, assuming I had implicit confidence in the methods of him who performed the test. My impression is that general paralysis, so far as this asylum's records show, is actually increasing year by year, and this holds good for both sexes. In passing, may I say that the clinical picture of general paralysis given in the text-books is not very frequently seen now ; it is being replaced by a rapidly dementing form of the disease, with but a trace of the classical megalomanic deliria.

I cite this particular case of general paralysis owing to the exceptionally early incidence of the symptoms. I have never met a case in so young a person, either male or female, when due to acquired syphilis, though, as you are aware, cases due to inherited syphilis are not uncommon. The youth of my patient is the only interesting feature of the history.

Bertha L., aged twenty-three, single, was admitted into the receiving-house from the Melbourne Hospital on the 4th July, 1913, on certificates which stated that she suffers from alcoholic dementia, unable to manage herself or her affairs, talks volubly and incoherently, is noisy all night, and is violent, uses atrocious language, and accuses the other patients of swearing at her ; is faulty in her habits. The duration of the disorder on admission was stated to be two weeks.

There was a history of her having been drinking for three months, and she gave a confused account of having had delirium tremens. In the Melbourne Hospital, where she was admitted on the 29th June, 1913, she had vivid visual hallucinations, saw snakes and demons on her. A diagnosis of acute alcoholism was made.

The family history shows that her father is an alcoholic, and somewhat feeble-minded, though a wage-earner ; her mother suffers from some undefined "nervous affection" ; her paternal grandmother died of phthisis ; her brothers and sisters are apparently normal. The patient was said to have been a barmaid, and of very alcoholic habits, but both these statements are emphatically denied by her mother.

She was admitted to Kew on the 11th July, 1913, in a maniacal condition, and was well nourished. There was continual motor unrest. She was incoherent and rambling, no sensible replies being obtainable ; noisy, and requiring constant restraint, either physical or chemical, chiefly the latter. She confused identities, and was quite disorientated for time, place, and person. Everything had to be done for her ; she was constantly either disarranging her clothes obscenely or taking them off ; was very erotic, and used disgusting language. Owing to the degree of alienation it was impossible to elicit the presence or otherwise of delusions or hallucinations. The heart showed mitral stenosis, the lungs were apparently normal, the pupils were unequal and inactive to light, knee-jerks very exaggerated, tongue tremulous, no observable speech-defect. Blood gave a positive reaction to Wassermann. The patient continued in a maniacal condition, and became during that time very emaciated. From the 26th October she had several epileptiform seizures, and died on the 16th November, just four months after reception.

I am indebted to Dr. Lind, Pathologist to the Victorian Lunacy Department, for the appended notes of the post-mortem appearances, which corroborate the clinical diagnosis :—

Circulatory system: Very small, almost infantile, heart; slight trace of early atheroma in arch of aorta; chronic endocardial thickenings with sclerosis of valves, without impairing function. Fibroid changes in muscle of heart; coronaries normal. Spleen very adherent to diaphragm, and capsule thickened. Both lungs lumpy with bronchopneumonia, right lung showed small softening at apex of middle lobe. Liver congested with thickening of the capsule. Left tube and ovary matted together. The whole of the anterior surface of the uterus adherent to the bladder, causing that organ to be dilated. Other pelvic adhesions present. The lower pole of the right kidney showed small tubercular deposits in the cortex.

Nervous system: Calvarium thin and translucent. Dura somewhat adherent to skull. Pia arachnoid milky and very adherent to the cortex. Convolutional pattern normal. Frontal gyri show a certain amount of shrinking. Lateral ventricles dilated. Basal vessels all in good condition. Puncta cruenta engorged. Ependymal granulations in the 4th ventricle, in both the lateral recesses and right down to the apex of the calamus scriptorius. There was compensatory excess of cerebro-spinal fluid. On section of the brain no gross lesion was found.

Paranoia.

The notes of the following case will serve, I hope, to illustrate some of the characteristics of the mental disorder termed paranoia or chronic delusional insanity. Paranoia, though fortunately not very common if its use be restricted to those cases which exhibit systematized delusions of a persecutory character, is by some writers used in a very elastic manner. The term then becomes a nosological drag-net, and is made to embrace all kinds of cranks, eccentrics, members of the anti-this or anti-that league, seers, mystics, occultists *et hoc genus omni*.

The recognition of the true paranoiac is important both from a medico-legal point of view and from the fact that such persons are invariably dangerous—homicidal, in fact. They are the more dangerous because they are often able to conceal their delusions until the violent outbreak occurs, resulting in injury or death to others. It is essentially a chronic disorder, progressive and incurable.

P. A., a carpenter, was first received into Kew Asylum in November, 1904, at the age of forty-seven, on certificates which stated that he had delusions of his wife's fidelity, and was dangerous to his wife. After admission he was found to be unduly suspicious, and declined to converse about the circumstances of his case, but regarded himself as a much-injured man, and was emphatic that his committal and detention were illegal. He had thrown vitriol at his wife, and at the point of a revolver had extracted from her a quasi-confession as to her adultery with several men. In three weeks' time he was allowed on probation, and was subsequently discharged.

Thereafter he agitated frequently in the law-courts to have the date of his discharge made to agree with the date of his committal to the asylum. This application was finally refused by the Chief Justice, and from that time on the man regarded himself as "legally dead and without civic rights" (to use his own expression). He worked at his trade efficiently, and supported his child, but resolutely refused to pay any taxes. He harassed lawyers innumerable, soliciting them to take up his case, but none seemed willing to do so; and on one occasion he threatened to shoot a legal practitioner. Subsequently he endeavoured, without success, to obtain a divorce from his wife on the ground of adultery; and at the termination of the trial he created a scene in Court by accusing the Judge and the barrister who was appearing for him of conspiring together against him, and so preventing his obtaining what he sought. By this time his delusions had become well systematized, and the circle of his persecutors had greatly widened.

Little or nothing was heard of the man until October, 1912, when, aided by a scheming pseudo-sympathizer, he began to address public meetings, whereat he gave free expression to the persistent persecution he said he was subjected to at every turn. As an outcome of the wildly extravagant and at times threatening statements he made at those meetings concerning many public men and officials, whom he regarded as all being in one huge conspiracy against him, he was arrested and tried as a lunatic. He doggedly refused to hold any converse with the examining medical men called on behalf of the police, just as he had done eight years previously. The hearing of the case occupied the whole of one day, and he was certified insane, and was admitted to Kew Asylum for the second time on the 14th December, 1912, on the following evidence: (*a*.) He said that he had never been discharged from Kew Asylum, and that he was legally dead. (The fact that he had been properly discharged was proved by the production of the asylum records.) (*b*.) He said those records had been falsified by the Chief Justice himself. (*c*.) He accused a Judge of the Supreme Court of committing adultery with his wife, and gave details of several such acts in pornographic language. (The Judge swore that he had never been in the town where one of the acts was said to have taken place.) (*d*.) He said he was the victim of a widespread conspiracy, which included many prominent men, such as the Premier, the Attorney-General, the Speaker, the Supreme Court Judge, the Lunacy Department, the Police, the Justices, and some citizens of the suburb where he resided.

On admission to Kew the man had a furtive, hunted expression, and was unreasonably suspicious of the motives of others; he either gave evasive answers or refused to reply when questioned by one who he thought was opposed to him. Owing to the nature of his delusions and his distorted judgment, he gave utterance to untruthful statements with reference to himself, his case, and those whom he said were conspiring against him.

After five or six weeks residence in the asylum it was arranged that he should return to his native country, Denmark; and he was allowed to leave the institution daily in the care of a friend to make the necessary arrangements for his departure. During these outings, it was afterwards found, he had spent much of the time interviewing various medical men in order to obtain from them certificates as to his sanity. And he did actually receive three or four such certificates from reputable practitioners. One would surmise that the ordinary medical man, if approached by a stranger with such an unusual request, would view the matter with curiosity, if not suspicion, and either decline to give such a certificate or temporize with the patient until such time as he had made inquiries concerning the facts of the case. It is more difficult to give a certificate of sanity than to issue one of an opposite character.

Everything seemed to be in readiness for the patient's departure from the State, but one day he failed to return from his parole, and I have heard nothing about him since.

Thus ends the second chapter in this eventful history, but I entertain feelings of apprehension as to what will happen in the third chapter, for there will assuredly be a third chapter.

SOME PRACTICAL ASPECTS OF PSYCHO-ANALYTIC TREATMENT.

By Professor Ernest Jones, M.D., M.R.C.P. (London),

President of the London Psycho-Analytic Society.

[*Read by Dr. James Boyd, Auckland.*]

I TAKE this opportunity of discussing shortly a few of the practical points that arise in connection with psycho-analysis, and shall divide my remarks under the headings of the treatment, the case, the patient, and the physician respectively. Some general knowledge of the subject will be assumed(1).

The Treatment.

The length of time necessary for the treatment is often urged as an objection to its applicability, and may certainly be a matter of practical difficulty. One of the patient's first questions when a course of treatment is proposed to him very naturally is, How long will it take? It is often an embarrassing one to answer, and for the following reason: The duration depends not only on the nature and severity of the neurotic condition, which can usually be estimated in one or two interviews, but also, and to a still greater extent, on the type of personality we have before us. It is not so much a question here of the variation in intelligence, self-insight, determination, and other character-traits that occurs among different patients, important as these are, as it is of the mental attitude towards recovery. This attitude is one that sharply distinguishes psycho-neurotic disorders from all others. In the latter, one assumes, usually with right, that the patient whole-heartedly desires to get better, and this is often a factor of no mean importance in the fight, but with any neurosis one may predicate with certainty that only a *part* of the patient's mind is set on recovery—the conscious part that leads him to seek help—whereas another equally significant part is just as set on remaining in the neurotic condition, and that in spite of all the obvious disadvantages of this(2). It matters not the slightest how much the patient may protest his eagerness to get well at all costs, one knows definitely from the very fact of his suffering from a neurosis that he is in a state of internal conflict—that one part of his mind is warring against another, and that his condition is the result of this. A neurosis essentially means that the patient is unconsciously clinging to various infantile pleasurable longings and phantasies, long since buried through the " repression " of inhibiting forces, and hence quite unknown to the patient, and that his symptoms, an expression of this conflict, constitute a compromise-formation by means of which he vicariously obtains an indirect symbolical gratification of these. This is the ultimate basis of any psycho-neurosis, though, of course, other later factors are also concerned, the more current conflicts between the patient and his actual situation in life that are more generally observed by himself and the physician. It follows from this consideration that recovery from a neurosis always involves an element of *renouncement* on the part of the patient ; he has to learn to turn his interest away from the world of phantasy, however pleasurable this may be, and devote it rather to the external world of affairs. Renouncement is never one of mankind's easiest feats, and we note a considerable variation among patients in this respect. It is less difficult of accomplishment when the phantasies in question lie mainly in the past. When the shirking of a current difficulty has been an important contributory factor in the patient's withdrawal into himself then the task is harder.

The estimation of this important personal factor needs time, so that one can never say beforehand exactly how long a given treatment may last. Under these circumstances, the only thing to do is to fall back on one's general experience, and state the matter in average terms. I find that my average length of treatment is about six or seven months, the shortest being four months, while a few cases even require a year or more. Those who are familiar with the immense amount of work involved in such a treatment, and the revolution that is effected in the patient's mind, will appreciate why such a long period is necessary, especially when the long duration of the symptoms in most cases is also taken into account. Efforts have been made to shorten the time, but with a more than negative result, for refinements in technique have only brought about a higher standard as regards what we may properly term a cure, and it has also been perceived that the mere passage of time is in itself a mechanical element that is indispensable to the workings of the treatment. The only practical aid that I know of is the plan of getting the patient to attend for two hours a day, either consecutive or not, instead of the usual one. This I have adopted in a number of cases with advantage ; it is, however, inapplicable with very emotional patients.

The Case.

It may be said that, with relatively few exceptions, all cases of psycho-neurosis are suitable for the treatment ; the contra-indications are sufficiently well known(3), so that I need not enumerate them here. The treatment has been extended on to the field of the psychoses, but naturally with less favourable results ; although *symptomatic* improvement may in this way be obtained in certain selected cases of dementia praecox, particularly the catatonic variety, the psychosis that is most promising in this respect is manic-depressive insanity, especially the cyclothymic type, and here some highly gratifying results have been effected. Apart from the psycho-neuroses proper, one finds in practice that patients come for such apparently non-medical conditions as failure to devote interest to their work, marital or family friction, and various other forms of dissatisfaction with the immediate environment or with life in general, and one is often able to help such patients to a quite surprising extent. Sexual inversion and the perversions are also in general amenable to the treatment, as are alcoholism and other drug habits, but here more even than with the psycho-neuroses the prognosis depends mainly on the patient's real desire to be cured; if, for instance, a homo-sexual regards his condition as perfectly intelligible and natural, as is often the case, but expresses a mild wish to have it changed on account of its practical inconveniences, legal and otherwise, the chances of success are much fewer than with a patient who has a strong abhorrence of what he considers as an unnatural but uncontrollable impulse.

The superiority of the psycho-analytic treatment does not manifest itself in the same way with these different conditions. With hysteria, for instance, where showy results are often to be obtained by other methods, it is not always at first sight very striking. As I have pointed out elsewhere, the essential factor in all other methods is suggestion, so that the contrast between suggestion and psycho-analysis, which strongly repudiates this, sums up the whole of the psycho-therapy. The advantage of the latter method resides in the greater thoroughness and permanence of the results, and in its prophylactic value for the future, the reason being that it deals not only with the symptoms present at a given date, but with the whole of the repressed mental material that is the basis of all neurotic manifestations, present or future. One does not therefore see what is so common with the suggestion treatment, the subsidence of one group of symptoms, followed at some future date by either a recurrence of these or by an outcrop of a fresh series. With the obsessional neurosis, the doubts, impulses, obsessions, and "manias" that are sometimes included under the name "psychasthenia," the psycho-analytic treatment evinces its superiority over the others in a still more marked manner, for, except to a slight extent, these conditions are hardly susceptible to suggestion. Indeed, the obsessional neurosis, being obviously a purely mental condition, is eminently suitable for the psycho-analytic procedure, and the results obtained would be even more brilliant were it not for the fact that so many patients, not realizing the pathological nature of their condition, do not consult a physician at all until an advanced stage. The various anxiety-states also constitute a promising field, especially where the morbid anxiety has become elaborated into a complex phobia of a definite object or idea. Of the other conditions I have already spoken, and we may sum up by saying that, although the outlook is not equally good in all cases, it is always better if psycho-analysis is resorted to than if any other method is.

The Patient.

It is evident that in proposing a course of psycho-analysis to any patient one is demanding from him a serious sacrifice. Not only is the question of time, which we have discussed above, an important consideration, but an attitude of patience and determination is required, and all other business of life has to be made subservient for the time to the treatment itself—for example, in the matter of keeping appointments. Further, the cost, though much lower than in any other field of remedial therapeutics—for instance, surgery—may amount in the course of time to an appreciable outlay. It is well at the very start not to underestimate these considerations, but to make the patient see that the treatment is a serious undertaking, not one to be lightly entered upon. This is not only the obviously honest course to take, but one that has the further advantage of avoiding later disappointment to both the patient and the physician, through the former coming to realize that the treatment was a bigger undertaking than he had counted on.

On the other side have to be reckoned the penalties of a chronic neurosis—for one can never foretell when an apparently mild one, if untreated, may not be the forerunner of a more severe form—where the patient's capacity for performing his duties in life and of earning a living is seriously diminished, and where he is doomed to numberless rest-cures, holidays, and health-voyages, not to mention the suffering entailed both on himself and on those around him. On the whole, therefore, the treatment will be found to be a sound investment from the patient's point of view, and the gain in many cases one that no sacrifice is too great for.

The Physician.

The qualifications needed for psycho-analytic practice are a sound knowledge of neurology and psychiatry, especially on the diagnostic side, and a sympathetic interest in psychology, with the patience, objectivity, and tact that go with this; indeed, no other motive than the latter is likely to lead any one to take up the work, where the main rewards are the intrinsic interest of it and the satisfaction of being able to alleviate such distressing suffering as is involved in mental disturbance. The methods of acquiring a suitable knowledge of the work are, of course, the same as those applying elsewhere in science, with, however, one exception that will presently be noted. The three routes thus are: A familiarity, through reading, with the work of others (a reading-knowledge of German is in this connection highly desirable, even if not absolutely essential); endeavours, at first necessarily tentative and experimental, to apply the method in practice; and personal study with some one who has an adequate experience and knowledge of the subject. The last-mentioned point is worth insisting on, for on the one hand the correct technique consists of such a mass of detail that it is almost impossible to include it all in any description, and on the other the range of the subject is so extensive that the learner finds that he is constantly wanting to put questions and receive enlightenment on points that may not have been adequately dealt with in the literature accessible to him. These considerations render personal contact with a teacher a well-nigh indispensable preliminary to acquiring a suitable knowledge of the subject, and it will then be found that conclusions which may seem improbable and difficult to comprehend in the condensed form in which they are often presented in writing are usually susceptible of being cleared up by a personal explanation. For the guidance of those who are not *au courant* in the matter, I might, without wishing to be invidious, mention the names—besides, of course, Professor Freud, the originator of the method—of Dr. Abraham, of Berlin; Brill, of New York; Dr. Ferenczi, of Budapest; and Drs. Federn and Hitschmann, of Vienna, as being thoroughly competent men in this department; all these speak English, with the exception of Dr. Hitschmann.

It was hinted above that acquiring the psycho-analytic method differs in one respect from the acquiring of any other scientific method.

This difference is due to the fact that in the present case the acquiring instrument—namely, the mind—is itself the object of study. The subject of psycho-analysis deals mainly with the internal friction and conflicts of the mind, and it is held that no mind, however "normal," has escaped these. The result is that unless one is able to face freely the buried conflicts in one's own mind—in other words, to have a considerable understanding of oneself—one will continually be the victim of a distorted judgment in the case of others, not seeing tendencies in them that one does not wish to see in oneself, laying too much stress on others for subjective reasons, and so on. On this account it is strongly urged that any one taking up the practice of psycho-analysis should himself be submitted to an analysis under the same conditions as a patient, and I can cordially endorse this advice from personal experience. The gain achieved is not only that one attains a free working of one's own mind, with consequently a much greater objectivity towards the mental workings of other people, but also that in this way one learns to appreciate more fully than in any other the difficulties and various reactions experienced by our patients.

In conclusion, it will be seen that the sacrifices demanded by psycho-analysis are very considerable, in the case both of the patient and of the physician ; but in the opinion of those competent to judge, there can be no question but that the results obtained, which are as brilliant as anything modern medicine can show, more than compensate for them.

REFERENCES.

(1.) See Ernest Jones. Papers on Psycho-analysis. (Baillière, Tindall, and Cox, London, 1912.)

(2.) See a discussion of this matter in pp. 358–61 in the section on "The Treatment of the Neuroses in Jelliffe and White's Treatment of Nervous and Mental Diseases." (Lea and Febiger, New York, 1913, vol. i.)

(3.) See my papers, p. 202.

DISCUSSION.

Dr. James Boyd (Auckland), in reply to a request from Dr. Yule, gave an outline of the psycho-analytic method of treatment. He took one of his own cases as an illustration—a case of pathological shyness, and showed that this was due to a homo-sexual happening in the patient's youth, this solution being arrived at by means of word-association and dream-analysis. This elucidation took a week exactly, showing that some cases, happily, can be cured in much less time than that usually allotted. In replying to a remark by Dr. Stuart Moore of the application of psycho-analysis in everyday work, Dr. Boyd related a case of dream-analysis in which the interpretation immediately cured an acute attack of "anxiety" haemosis in an elderly maiden lady. Seen ten months later she had had no further attacks. To acquire a proper understanding of Frend's methods, Dr. Boyd deprecated the reading of occasional papers on the subject. He advocated the study, seriatim, of "Psycho-pathology of Everyday Life," "The Sexual Theory," "Hysteria and other Psycho-neuroses," "The Interpretation of Dreams," all of which can now be obtained translated into English.

Dr. Stuart Moore (Dunedin) said,—The paper of Dr. Jones is extremely useful to me. It provides me with a terse statement of the prospects and methods of pyscho-analysis, which I can make use of in the first interview with patients. I have ventured, without the full qualifications described as desirable by Dr. Jones, to enter this field of treatment. I have had no personal contact with any one else engaged in this work. I am not a person of any great experience in psychiatry, though I have spent some weeks in an asylum. I have not been subjected to a psycho-analysis by any psycho-analyst. I feel justified in my action, however, because these desirable things were unattainable by me, and I had to work as I was or leave my patients without any rational attempt at treatment. So far as I can see, I have done no harm, and I am satisfied I have done good. I approached the subject gradually, dealing at first with hypnotism. After some successes I soon concluded that that method of treatment would not carry us any distance in the treatment of many functional cases. After some difficulty I got hold of Frend's work, and I have been since an ardent student of his writings. I found the work at first very fatiguing. This, I found out, was due to my patients' condition trespassing on my own complexes. I know now that when I find the work so exhausting to search my own heart and discover my own complexes. This process of self-analysis must be undertaken by any one engaging in this work, and must be continued as he gets fresh cases. One point in practice I have discovered which is of great importance to success, and which I have not seen mentioned, is that if I see a patient too often he becomes so upset that he leaves me. The reason he gives has nothing to do with his complexes, and is a false one. If the analysis is pushed too strongly the patient cannot stand it. One woman patient, for instance, I dare not see more than once a week. She is doing very well. She has lost her hallucinations and her sexual anaesthesia. Every time I see her I find something good, but she needs the week to recover her courage to face me.

As regards future developments and the possibility of a short-cut in treatment, the work of Pawlow on the development of secondary reflexes elucidates the principles on which the production of hypnotism in animals depends. I have for long thought and taught that hypnotism could not be explained by suggestion alone, but that some process allied to reflex action must be present. This work of Pawlow holds out the hope that we may yet be able to hypnotize deeply many more people than at present, and if we can learn to do that it remains to be seen whether hypnotism thus induced may not shorten our work of psycho-analysis. In future I expect to see our emotions traced to reflex action and to bio-chemistry. Of course, they will not solve the problem of consciousness, which is an elemental conception. When we have traced our emotions in these two directions we shall be able to cure our patients, I believe, much more easily.

SECTION OF PUBLIC HEALTH AND STATE MEDICINE.

(SUBSECTION OF SCHOOL MEDICAL INSPECTION.)

SCHOOL CLOSURE AND INFECTIOUS DISEASES.

By C. Savill Willis, M.B., M.R.C.S., D.P.H., &c.,

Principal Medical Officer, Department of Public Instruction, New South Wales.

Our knowledge of the causation, spread, and prevention of infectious diseases has advanced very considerably during the last few years. Unfortunately, however, laymen, including the so-called health administrators of our country towns, and even country medical practitioners, still cling to the old-fashioned ideas handed down from former generations.

The school has for some years past been held to play an important part in aiding the spread of infectious diseases. No doubt this has been so in the past, when children were overcrowded in badly ventilated and unhygienic buildings, and using many articles—such as slates, pencils, towels, drinking-cups, &c.—in common. With our present knowledge, however, we are in many cases able to use our schools as powerful aids in checking the spread of infectious diseases. Moreover, it is a very common mistake to give to the influence of the school in the spread of infectious diseases the full importance its face-value would appear to warrant. A little consideration will show that this, in the majority of cases, is not justifiable.

Most of the infectious diseases are essentially diseases of childhood and naturally their incidence falls very largely on school-children, as these children happen to belong to the right age-period. Then it was a common belief among the past generations that children must suffer from certain infectious diseases, and the sooner the infection came along the better. As a consequence, mothers were accustomed to purposely expose their children to infections. In these days this is not done, as mothers know that it is not necessary for a child to have measles, scarlet fever, &c. ; consequently, more children now reach school-age who are still susceptible to the various infectious diseases. Again, it is much easier to hold the school responsible for a number of cases of infectious disease than to make outside investigations, which, in many cases, would bring to light the existence of a cause quite outside the school—for example, an outbreak of scarlet fever occurring in Cooma, New South Wales, some four or five years ago.

In this outbreak, as one would expect, a number of school-children were attacked. As usual, the school was blamed. I went to Cooma, and on investigation I was able to prove that a large proportion of these children received direct infection from a mild unrecognized case of scarlet fever in a small boy not attending the school. This little chap had such a slight attack that he was not even ill enough to be kept indoors, and the school-children referred to above used to play with him after school hours. At the time of my visit I found that he had just reached the desquamating stage.

This is a good example of what has been shown to be the case by Dr. Kerr, School Medical Officer of the London County Council—viz., that " out-of-school conditions are far more powerful means of disseminating infectious diseases, and that the school plays a comparatively secondary role."

If the local authority, instead of merely considering the number of cases occurring amongst the school-children, and being content to sit down and blame the school for the transmission of the disease, had investigated the matter properly the origin of a number of cases would have been discovered, and some children, at least, saved from infection.

Let us now consider how infectious diseases are transmitted. As you all know, there are two main channels of infection—viz., (1) by direct, and (2) by indirect infection ; or, in other words, (1) by contact with the patient, or (2) by contact with articles or people infected by persons suffering from the infectious disease.

Direct Infection.—As regards the most common infectious diseases—diphtheria, measles, scarlet fever—direct infection, of course, plays the more important part in the spread of the disease. If a person suffering from one of these diseases comes in contact with others, infection is liable to be spread. This is most likely to happen in the early days of the disease, before the patient is ill enough to take to his bed. In measles the most infectious period is before the rash comes out, when the patient is going about with a watery discharge from eyes and ears. Scarlet-fever patients are most infectious when there is any discharge, such as from the ears, throat, nose, &c. This discharge is probably much more infectious than the peeling-skin. Children who have had scarlet fever are often left with, say, a discharging ear. They are at this stage, although feeling well and mixing freely with other children, in a highly infectious condition, and a source of danger to any one coming in contact with them. Diphtheria, we now know, is commonly transmitted by means of " carriers."

Where are these infectious beings most likely to be discovered? In the world at large, or in the school? To try and find them in the world at large is not very much better than looking for a needle in a hay-stack, but the school, given a certain amount of observation properly guided, or, better still, expert investigation by medical officers skilled in their work, affords an ideal place for their discovery; and I shall later on give some examples of the use we have made of the school in this connection. Again, teachers early in their course of training are now being instructed how to recognize the early symptoms of infectious diseases in children; and a circular compiled by me, and issued by the Education Department of New South Wales in the April number of the *Public Instruction Gazette* (Circular No. 6, amended reissue), instructs teachers under what conditions children are to be excluded. This exclusion must act as a warning to the parents as to the possibility of the child being infectious, and consequently helps considerably in the prevention of the spread of infectious diseases.

Indirect infection cannot be overlooked. Infection is, of course, carried by articles of clothing, the leaves of books turned over by the finger wetted by saliva, slates which are usually cleaned by spitting on them, common penholders and pencils which are usually put in the mouth, the use of drinking-cups and towels in common, the not unusual practice children have of passing sweets from mouth to mouth, &c.

Most of these sources of infection are now being eliminated. The use of slates, and school towels, and drinking-cups is now being discontinued, and cloak-rooms are being so built that the children's hats and cloaks will be kept well away from the class-rooms. Articles, such as pencils, penholders, to be used in common are in future to be sterilized each day.

Let me here call your attention to the fact that diphtheria, measles, and scarlet fever are not due to infected water or bad sanitary arrangements. It is so very common to find that when a number of cases of any of these diseases, and especially diphtheria, occurs in a school, the local sanitary inspector or the teacher, or even the country doctor, immediately suspects the water-supply or the sanitary arrangements, and goes so far as to collect samples of the water for analysis, and makes a report on the sanitary condition of the outhouses, &c. One of the difficulties of school medical officers is to overcome this ignorance of the causation of infectious diseases.

As regards typhoid fever, the school is in a very different position. In this disease the infection is rarely carried to the school by the children, unless there happens to be a "carrier"; consequently, unless the sanitary conditions of the school are bad, the school rarely plays any great part in the spread of infection.

What action should be taken when infectious diseases occur amongst school-children?

Unfortunately, most local authorities in the State would immediately say, "Close the school." The first thing a local authority does is to ask that the school be closed. This, no doubt, is often due to want of knowledge, but it would also often appear to be due to other reasons. See what a lot of credit the local people will give to the "active public health administrators" who ask for the school to be closed! And it is such an easy and comfortable way to get credit—to write a letter and ask other people to do the work! Unfortunately, one often finds certificated sanitary inspectors, school-teachers, and even doctors advising this course. *Closure of schools, it is now recognized, is, in the majority of cases, a most crude and unscientific way of dealing with outbreaks of infectious diseases.*

What is to be gained by closing the school? Let us consider an outbreak of measles. This disease is infectious before the rash comes out, and consequently before the condition can be recognized, and while the child is still attending school. Consequently, a certain number of children would be infected before it is known that the case is measles. Then, in about twelve days, the children who took infection from the first case will infect practically the whole of the remaining susceptible children; and it is at this date—*i.e.*, nearly two weeks after the first case—that the cases begin to become numerous, and by that time practically all possible harm has been done, and there is therefore nothing to be gained by closing the school.

In typhoid fever the child may, in exceptional cases, be slightly ill some days before being kept away from school, but even then he is probably only infectious through the discharges; and if the sanitary conveniences of the school are kept in proper order the risk to the other children is slight, and disappears on removal of the patient; consequently, school closure is only very exceptionally necessary or of any advantage in cases of typhoid fever. Even when the disease breaks out in the school-teacher's residence, careful investigation is better than closure, as instanced by the following case :— .

A few months back a case of typhoid fever occurred in the family of one of our school-teachers, who lived in a residence adjoining the school. This was the fourth case in three years, and, moreover, the cases were occurring here, and nowhere else in the town. The usual cry, of course, was raised that the house was infected, and was a danger to the family living there, and possibly to the whole school. I visited this place, and investigated the matter. I was led to suspect one of the family as being a "carrier," and this suspicion was confirmed by bacteriological examination. The "carrier" was given directions how to act in future, and the outhouse was remodelled, to reduce to a minimum the possibility of infection. There will probably be no further cases in this house. How different would have been the case if we had merely shut up the house or even closed the school! The teacher's family would have moved elsewhere, and the same conditions would have been started all over again.

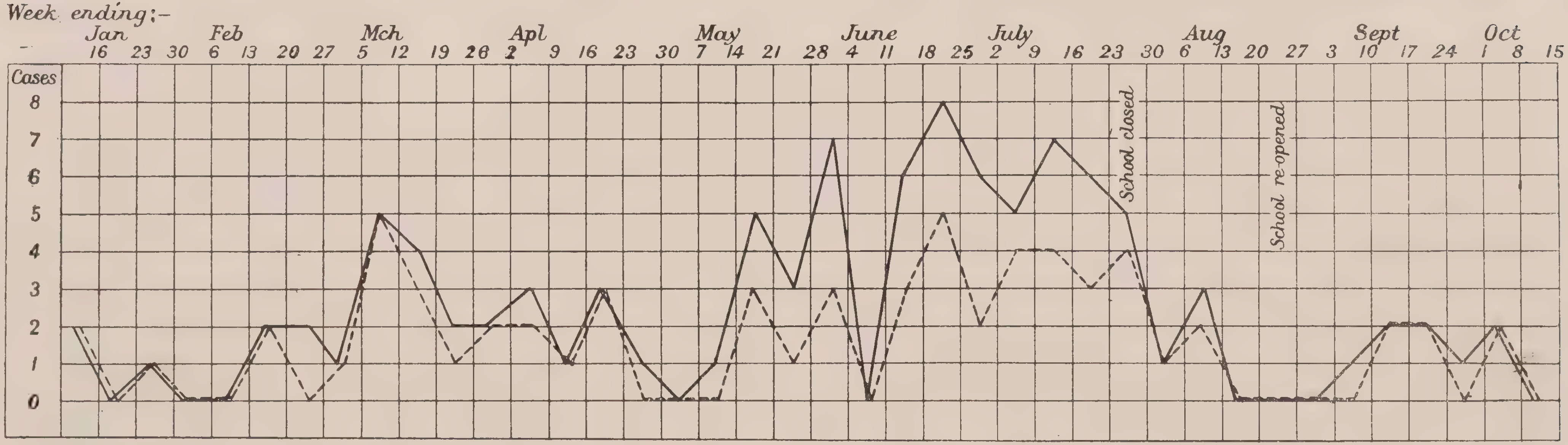
Now, let us take diphtheria. This disease we now know is to a very large extent spread by means of "carriers." These "carriers" may continue infectious for months. In nearly all cases where diphtheria occurs among school-children a number of the apparently healthy children will be found to be "carriers." What is the result of school closure? The children go home, and there may or may not be a reduction in the number of cases. The school sooner or later has to be reopened, and the "carriers," still unsuspected, return to school and start the outbreak all over again. We thus have the educational loss for nothing. On the other hand, if the outbreak is properly investigated at once, and bacteriological examinations made, the "carriers" will be found out and excluded, and will in the majority of cases get treated. In any case, they will be kept from school until free from infection. The outbreak, as far as the school is concerned, will in the majority of cases be ended. I have had "carriers" excluded from school attendance for thirteen and fourteen weeks. To keep a school closed for that length of time would interfere tremendously with education, especially if there happened to be, as there was last year in New South Wales, many schools affected. You will surely agree that it is much better to achieve a better result, with the interference with the education of a few only of the children.

Looked at from the point of view of the general population, we have, in the proper investigation of school outbreaks, a powerful means of checking the spread of infectious diseases.

We go to a school where there is, say, an outbreak of diphtheria. We discover so-many "carriers." The children are excluded, and the parents notified. In many cases the parents get these children treated, and thus some sources of infection are eliminated from the community as a whole. You will probably say, "But some of these children will not be treated." Perhaps so, but they will be labelled, and people will not allow them into their homes, and other children will be prohibited from playing with them.

The accompanying graphs and tables will help to show how unnecessary it is to close schools for outbreaks of infectious diseases. The schools referred to in the graphs were not selected to prove a case, but comprise the whole of the schools dealt with in New South Wales for outbreaks of diphtheria during the second and third quarters of 1913.

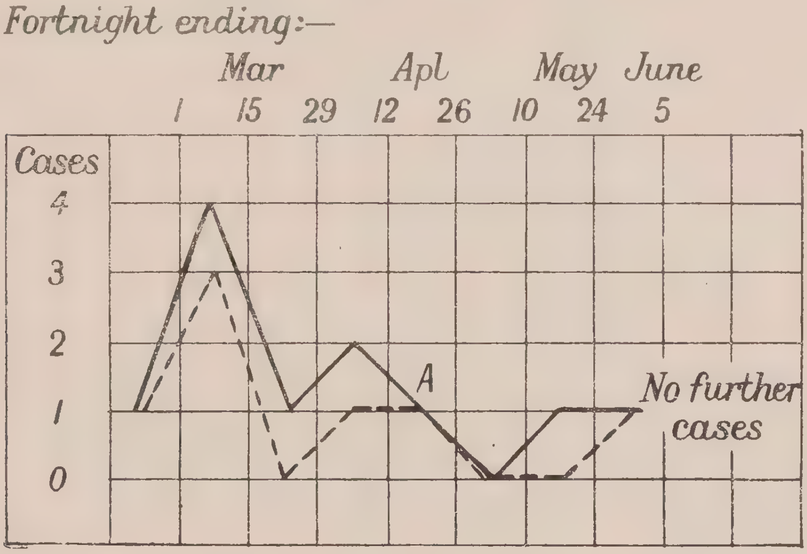
CHART I.—Showing the Number of Cases of Diphtheria notified as occurring in each Week from 1st January to 15th October, 1912



Continuous line indicates the number of cases among the whole population; broken line indicates the number of cases among the children of school age—5–15.)

Chart II.—Showing Number of Cases of Diphtheria notified as occurring in L. A. each Fortnight from 1st March to 5th June.

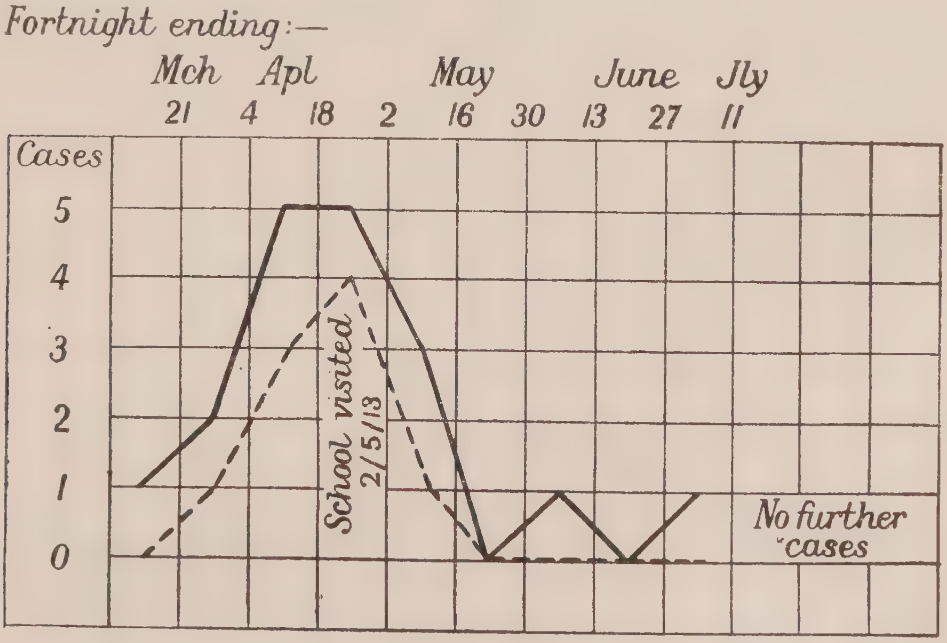
(Continuous line indicates the number of cases occurring each fortnight among the whole population; broken line indicates the number of cases occurring each fortnight among children of school age.)



A.—Investigated 25/4/13. A carrier (schoolmaster's son) found.

Chart III.—Showing the Number of Cases of Diphtheria notified as occurring in L. each Fortnight from 21st March to 11th July.

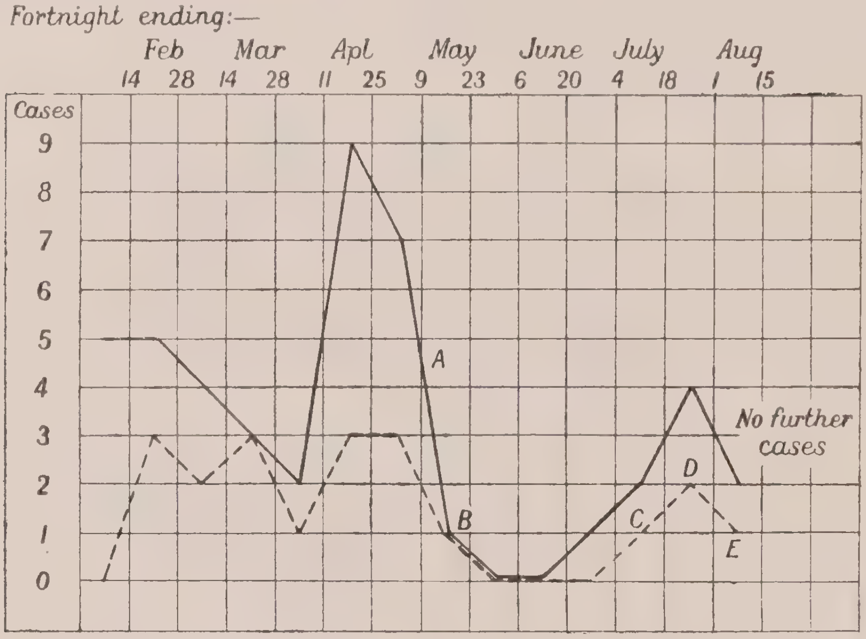
(Continuous line indicates the number of cases occurring each fortnight among the whole population; broken line indicates the number of cases occurring each fortnight among the children of school.)



Twenty-six (26) carriers found, including head teacher. School closed from 6/5/13 for four weeks.

Chart IV.—Showing the Number of Cases of Diphtheria notified as occurring in H.P. each Fortnight from 14th February to 15th August.

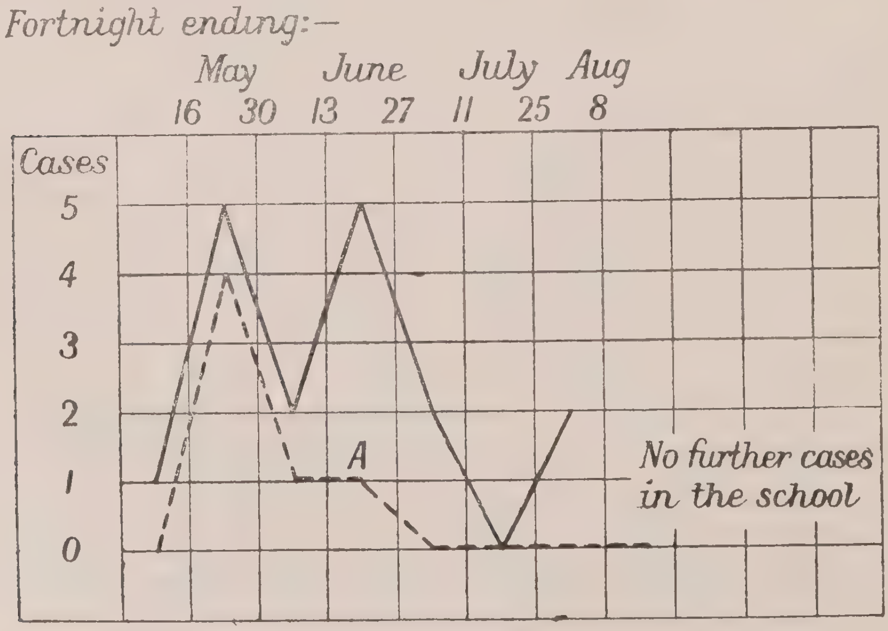
(Continuous line indicates the number of cases occurring each fortnight among the whole population; broken line indicates the number of cases occurring each fortnight among the children of school.)



A.—Investigated 13/5/13; twenty-one carriers and children from same families excluded. B.—Diphtheria bacilli found in throat of this case at time of investigation. C.—Sister of a carrier excluded at time of investigation. D.—Throat inflamed at time of investigation. E.—Not at school, and so not seen at time of investigation.

Chart V.—Showing the Number of Cases of Diphtheria notified as occurring in T. each Fortnight from 16th May to 8th August.

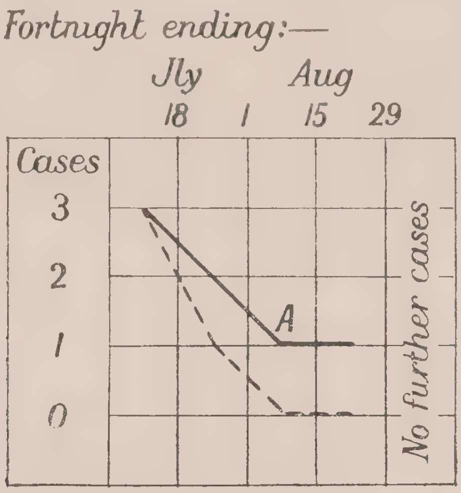
(Continuous line indicates the number of cases occurring each fortnight among the whole population; broken line indicates the number of cases occurring each fortnight among children of school.)



A.—Investigated 16/6/13. A carrier found.

CHART VI.—Showing the Number of Cases of Diphtheria notified as occurring in D. each Fortnight from 18th July to 29th August.

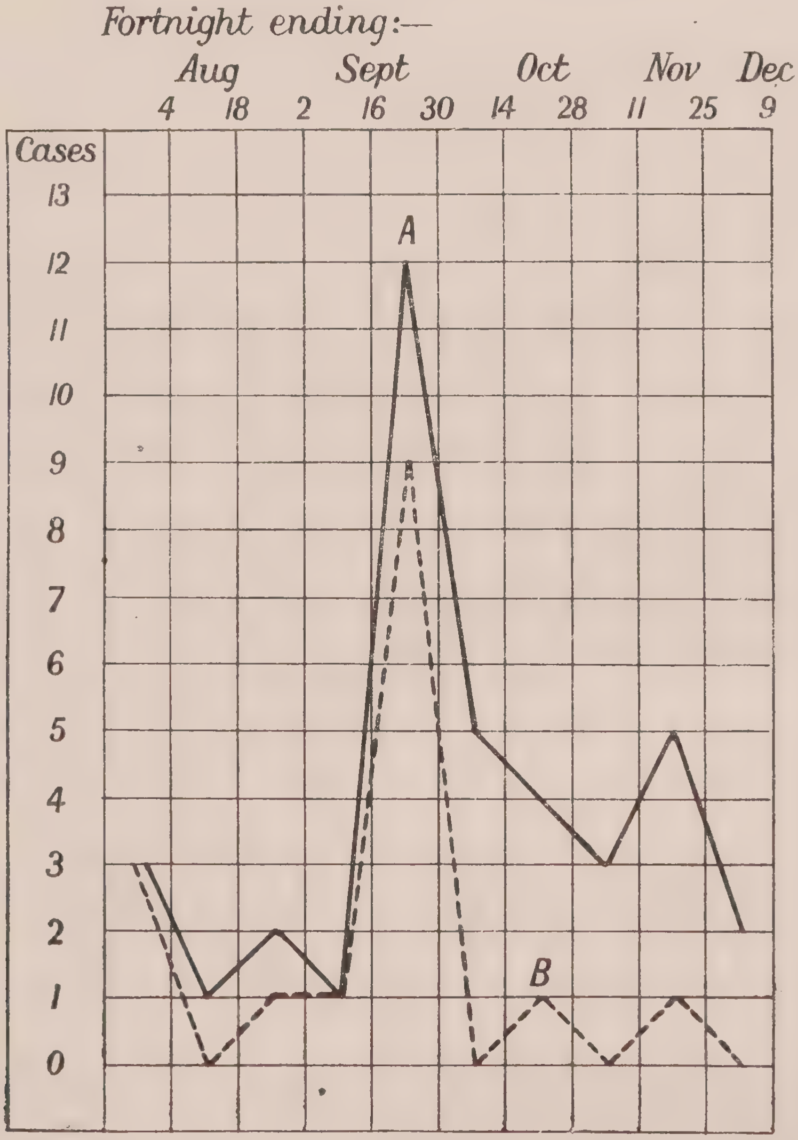
(Continuous line, cases among whole population; broken line, cases among children of school.)



Investigated 7/8/13. Brother of a carrier excluded.

CHART VII.—Showing Number of Cases of Diphtheria notified as occurring in W. each Fortnight from 4th August to 9th December (Christmas Vacation).

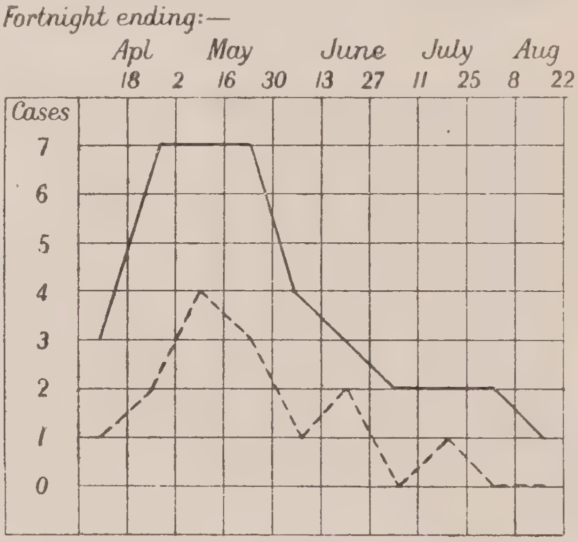
(Continuous line, cases among whole population; broken line, cases among children of school.)



A.—Outbreak investigated; twelve carriers, including two teachers, found and excluded from school. B.—This case not at school at time of attack (sister of a previous case).

CHART VIII.—Showing the Number of Cases of Diphtheria notified as occurring in C. each Fortnight from 18th April to 22nd August.

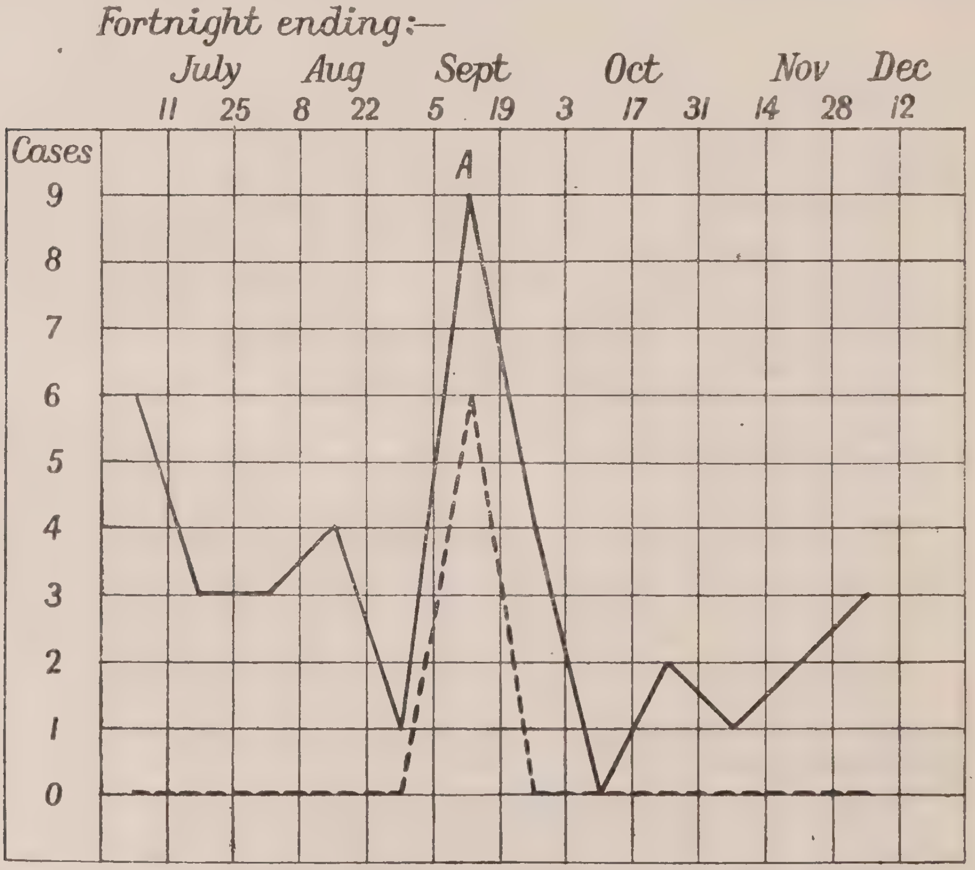
(Continuous line indicates the number of cases occurring each fortnight among the whole population; broken line indicates the number of cases occurring each fortnight among children of school.)



School first visited, 16/5/13. Investigations made on that and subsequent dates as children returned to school.

CHART IX.—Showing Number of Cases of Diphtheria notified as occurring at R. each Fortnight from 11th July to 12th December, 1913.

(Continuous line indicates number of cases each fortnight among whole population; broken line indicates number of cases each fortnight among children of school.)



A.—Outbreak investigated; four carriers, including a teacher, discovered and excluded from school attendance.

Disinfection of Schools.

A few cases of infectious disease occur in a school. Again the local Council has an opportunity of comfortably getting a lot of kudos by asking somebody else to do some work—in other words, by asking the Department of Public Instruction to disinfect the school. Teachers also rush to the conclusion that the school should be disinfected.

There has probably been much more harm than good done by disinfection (so called). People burn a little sulphur, volatilize a little formalin, or spray round some liquid disinfectant, and think they have done something worth doing, and so rest under a false sense of security. A disinfectant to be of any use must actually come in contact with the germs; consequently, unless thoroughly and properly done, disinfection is almost useless. Very few of our ordinarily used gaseous disinfectants have much chance to get at germs under ordinary circumstances. To do this the gas would need to be of the same density as air, so as to penetrate wherever air does.

I will not enter into this aspect of the question at any length, but will almost entirely confine my remarks to quoting a few of the leading authorities of the Old World.

Mr. Meredith Richards, Croydon, England, speaking from a wide experience, writes in his report that "The disinfection of the clothing of the sick, of their infective discharges and of infected articles, such as pencils and slates, is a wise precaution, amply justified by experience. On the other hand, the suggestion that we should sterilize the walls and floors of class-rooms by chemical means seems to be based on a misconception of the natural history of the diseases it is proposed to check, and a failure to estimate the relative importance of the various channels by which they are spread. Consider, for instance, two of the commonest and most serious school epidemics—measles and diphtheria. In both these diseases infection is given off from the throat or nose of the sufferer, and, in the vast majority of instances, from no other part of the body. Measles is specially infectious, because cough is an early symptom of the disease, and every time a measles patient coughs, infectious material is sprayed into the atmosphere. Should any susceptible children inhale these infectious droplets in sufficient dose they are said to have caught the disease, and will develop characteristic symptoms in due course. Rarely infective material may settle on the clothing of an insusceptible person, and be conveyed in that way to some other child. There is not, however, a tittle of evidence that measles-infection clings to walls, floors, and desks. Indeed, the contrary is proved by overwhelming evidence. . . . Similar remarks apply to diphtheria of the throat, which happily has a more limited power of spread, because it is not commonly accompanied by a cough to mechanically expel infection into the atmosphere. . . . That whatever infection reaches the floors and desks is so small in amount that it can be rendered innocuous by attention to the ordinary rules of cleanliness, and by free ventilation."

The School Medical Officer for Bradford reports to his Committee as follows: "The claim which is usually made for disinfectants in connection with the ordinary school-infectious diseases is, in my opinion, often of a very exaggerated nature. The school premises play an exceedingly unimportant part in the spread, for instance, of measles, and very much less than is usually thought in the spread, for instance, of diphtheria and scarlet fever. Indeed, personal infection is, in all infectious diseases, by far the most important cause of their spreading from one child to another. So far as the school premises are concerned, they are dangerous to health just in so far as they are dirty or dusty, and the first consideration should be to cleanse, not to 'disinfect.' Germs always exist in association with dust and dirt, and if the latter are removed there will seldom be need to disinfect in the ordinary sense of the word. To ensure that a school is rendered a safe place for children to be in, nothing further is necessary nor advisable than systematic cleansing with a suitable soap, and daily sweeping with plenty of damp material, and the systematic use of dusters which will retain and not merely disseminate the dust."

Dr. Kerr, Medical Officer (Education) of the London Council Council, states, " All our inquiries here and most of the teaching of recent years go to show that out-of-school conditions are far more powerful means of disseminating these diseases, and that the school plays a comparatively secondary role. The infection is from the children themselves, not from doors and cupboards, desks or floors; these means are trivial; it is the undetected or mild cases or 'carriers' continuing to attend that accounts for school spread of disease when it exists. It is little use disinfecting a schoolroom if the clothes and persons of the infected children cannot also be disinfected. The method of searching for the infective focus and removing it must always be the chief line of resisting the spread of infective diseases. With these facts in mind, the value of routine disinfection as applied to schoolrooms sinks to insignificance compared with its value in such a focus as a sick-room after the patient has been removed."

These opinions have received the approval of Sir George Newman, Chief Medical Officer of the Board of Education, England, by being included in one of his annual reports.

Remember, nature has supplied us with the best means of getting rid of any stray germs from our schools. Sunlight and fresh air are the most reliable and convenient means of removing possible infection from the class-rooms. This, aided by the proper use of the broom and the liberal use of soap and water, and the scrubbing-brush to the floors, desks, &c., is all that is necessary in practically all cases.

To *prevent* infection, schoolrooms should at all possible times be flooded with fresh air and sunlight. If it is not possible to keep the windows wide open while the children are present they should be widely opened as soon as the children leave, and especially during the play and luncheon recesses. How often does one go into empty class-rooms, and, finding the windows closed, is met with the expression, " I don't know how it is they are closed to-day. If you had come any other day you would have found them open."

This is a matter worth considering, as it affects the teacher almost as much as the child. Also, it has been well said, " Man's own breath is his worst enemy" ; so it behoves us to get rid of this enemy as soon as possible.

WHAT THE TEACHER CAN DO FOR THE HYGIENE OF HER CLASS AND SCHOOL.

By Janet L. Greig, M.B. Ch.B., D.P.H. (Melb).

One of the subdivisions of our work in school hygiene is the teaching of hygiene; but I consider that no science achieves its greatest usefulness until it becomes an applied science, so that my subject to-day really is applied hygiene. So far as we are concerned, the means by which hygiene is applied is through the teacher (who thus becomes the instrument in its application), so that on the teacher almost entirely depends the value of our work in hygiene.

Recently I had an opportunity of questioning teachers on this subject, and I found that invariably they had but two ideas. The first was that they themselves should be an *example* of everything hygienic; and, secondly, that they should give *formal lessons* on personal hygiene: both undoubtedly excellent, but I am afraid seldom sufficient to produce much result on the average child, for one knows how possible it is for a child to see a good example and avoid copying it; also how one can often get excellent answers on paper as to the care of the skin, teeth, and hair, and yet find the same child unaccustomed to a daily bath, and with teeth dirty and decayed, and head also probably infected. If, however, the teacher follows up such lessons with practical applications, such as inspections, drills, &c., how much more likely we are to get the good example followed.

Already teachers are accustomed to *inspect* hands and face, shoes and collar; and where this practice is extended to teeth and hair, and when these are found dirty and neglected, a word of advice given by the teacher to the individual child materially increases the attention they receive. I do not suggest that such inspections need be daily, but they should be at regular intervals, perhaps once a week.

Then we have the additional value of *drills*, such as tooth-brush drill and handkerchief drill; these correlate instruction and practice, and guarantee at least a minimum of attention.

Further, in some schools teachers have found the formation of small *clubs* successful, especially amongst the children of the infant classes. Examples of these are tooth-brush clubs, where each member contributes a penny or so a week to the purchase of a tooth-brush, and also agrees to obey certain rules as to brushing the teeth night and morning, and promising to use only his or her own tooth-brush, and to allow no one else to use it; one great difficulty we have to contend with is the use of the family tooth-brush: handkerchief clubs, where handkerchiefs must be produced daily and washed regularly. In each case marks are given, and a small reward or prize to the best in due course.

The assistance of the teacher at the *medical inspection* of the children has been found to increase her interest in hygiene, in helping her to appreciate details, and also in making her own inspections more valuable and accurate. The experience of the Victorian school medical officers is that their inspection of a class of girls shows at least 50 per cent. more dirty heads than would be recorded by a teacher on inspection of the same class. We have found great difficulty in making the teachers understand that the nits may spread the infection as well as the living parasite. They frequently do not record cases with nits only, and think a few nits quite insignificant. We have also found it hard to make teachers believe that boys, whose hair is cut comparatively short, can also be infected. The school medical officers find nits present in about 5 per cent. of boys. At the time of medical inspection opportunity is taken to give similar attention to cleanliness of teeth, and also to postures and clothing.

Much of hygienic value can be applied in *physical-training classes.* The teacher should see that all exercises take place in the open air, that they are preceded by handkerchief drill, and that deep breathing is properly carried out. This is also an opportunity for remedying postural deformities, and giving special attention to the erect posture. It is also a means of supervising clothing: much can be done by the introduction of a suitable physical-training costume.

With the teacher to a great extent rests the formation of *swimming classes.* Of all forms of exercises, we consider this the most valuable. Amongst its advantages are the following: that it is entirely pleasurable; that breast-stroke swimming, above all others, tends to correct and prevent postural deformities; that it may at any time be the means of saving the child's life and also the lives of other persons; that in particular it develops a love for water, and encourages the habit of bathing.

Again, to a great extent the teacher is responsible for the hygiene of the environment of the child—that is, the care of the class-room and supervision of *school buildings.* Although the teacher has no control in the construction of the school building, its hygienic value often depends more on how the teacher uses the rooms than their structure; even the most modern class-room, perfect as to light and ventilation, can have its best points spoilt if the windows are not opened and the blinds constantly kept lowered.

It is most important that attention should be given to the *fresh-air supply.* We urge that attention should not be given to ventilators only, but that in a temperate climate such as ours all the fresh air possible should be admitted by open windows and doors. Whatever necessity there may be for a minimum, no harm known can come from an abundance of fresh air.

Many teachers do better still, and hold their *classes in the open air* whenever that is possible. Every encouragement is given to this by the Education authorities and medical officers.

Lighting also is under the control of the teacher, both by the position of the class to allow of its coming mainly from the left side, and also by the use of blinds to avoid bright glare or intense heat.

The arrangement of *desks,* distribution of children, and *overcrowding* must also be strictly be attended to. Where desks are of assorted sizes the child must be placed at the desk best suited for it according to size and physical condition, not, as is commonly the practice of careless teachers, of allowing children to sit according to class merit.

Simplicity of furnishing is also usually at the discretion of teachers, as is the avoidance of the accumulation of waste materials and unused articles, and the provision outside of the class-room for children's hats, cloaks, lunches, &c.

Much of the hygiene of the class-room will likewise depend on its *cleanliness.* This usually rests with the standard set by the individual teacher, and the adoption of proper methods such as damp cleansing, sweeping with damp sawdust, damp dusting, and thorough and frequent scrubbing with soap and water. Outside the school building is required attention to drainage, collection of garbage in covered tins, and a suitable destructor for papers, &c.

Almost every one, I think, knows the importance to health of proper *sanitation and sewage disposal*, yet how few really know how it should be carried out. Here is, I think, a great opportunity for the teacher in the care of the out-offices. Cleansing is, of course, much simplified in a properly constructed building; where there are impervious walls and floors it is much more satisfactory, and this fact is deserving of much more attention than it generally receives. Often a school building is seen with decorative tiles in the fireplaces and lavatories, but rough bricks in the out-offices, presumably because they are not on show. Surely the position should be reversed, and no money spared on construction or attention to out-offices, the condition of which is so important to health. The cleansing usually consists of regular scrubbing of the floor and seat; where the out-offices are properly constructed, and in a water-carriage area, if this scrubbing is extended to the inside of the porcelain hopper, provided that all the plumbing is in good order, this will meet our requirements. Unfortunately, beyond the metropolitan area a water-carriage system is seldom found, and the most common type is the earth-closet, where much more attention is necessary. The first essential here is that these out-offices should be fly-proof for the prevention of typhoid fever and diarrhoea, both of which are disseminated by the fly. But what do we find even where the structure is fly-proof? What percentage of children close the door? Do they ever replace the cover provided? Surely such habits will depend entirely on the supervision of the teacher; also, the personal cleanliness will be improved by the supply of toilet-paper.

In the metropolitan area, country towns, and the larger country districts the disposal of the nightsoil is undertaken by the Councils and Municipalities, but in the outlying and rural districts this often devolves on the school-teacher, and the only site available is that of the school playground. With a proper knowledge of the requirements, and properly carried out, there need be no objection to the method, nor need it be very difficult. The most important thing is frequent removal, and where it falls to the lot of a woman teacher I would recommend the use of a white-enamel slop-bucket, emptied and cleansed daily, instead of the ordinary closet-pan. For disposal, a part of the school playground to which children have not access should be set aside, as far as possible from the school building. The nightsoil should then be buried in shallow trenches, 6 in. or 8 in. deep. This ground should lie fallow for six or eight weeks, and then be cultivated with some rapidly growing vegetation—anything that is not used for foodstuff without cooking. Potatoes have been recommended, and the English text-books usually suggest "osier beds." No further attention need be given to the soil, which can be used again in rotation if required. Fortunately, in Victoria cesspits do not exist, so that they need not be considered.

Further, in controlling the spread of *infectious diseases* in school, the teacher can prove our most valuable factor by observation and detection of sick and ailing children, and the early exclusion of the same, also by carrying out faithfully the medical officers' instructions as to periods of exclusion for each disease; best of all by abolishing the common mug and towel, and making provision for the substitution of *individual cups and towels* as has already been done by many teachers.

To the almost universal *bad habit* that children and young adults have of putting things in their mouths, such as pencils, pens, candy, &c., is attributed the spread of infectious diseases. Generosity frequently leads to lending or exchanging these articles, followed by an interchange of infectious diseases.

I hope I have made the purpose of this paper clear, for I believe that it is only through the teacher that we are going to achieve our results.

I am sorry to say that in Victoria we have not yet accomplished all these good things, although in most schools many of them are in actual practice, and we hope before long they will be general.

There is nothing suggested that could not be practised as part of the regular routine of school life.

SCHOOL POSTURES AND SPINAL DEFORMITIES.

By Reuter E. Roth, D.S.O., M.R.C.S. (Eng.), Sydney.

My reason for preparing this paper was the fact that during the many years that I have practised in Sydney as a specialist in spinal and other skeletal deformities I have come to the conclusion that about 90 per cent. of spinal curvatures are developed during the time of education —roughly speaking, between the ages of six and twenty.

Curvature of the spine is very rare amongst uncivilized, whilst it is very common amongst civilized races. The stately walk of African and Asiatic people is very noticeable. The same, I believe, is also characteristic of the Maoris and South-Sea-Islanders.

The infant, as it grows and gains strength, begins to crawl; then, in order to observe its surroundings, lifts up its head and develops a normal cervical curve. Later, during its transition from the quadruped to the biped, the child sits up in order to use its anterior extremities, and a lumbar curve is started. This latter normal curve progresses when, as a result of the assumption of the erect position, the erectores spinae become more and more developed.

In Turkey and Egypt one is struck by the fine pose of the men, women, and children. They do not use chairs, but either squat or sit tailorwise. No doubt the fine pose of the women in many lands is due to the custom of carrying burdens on the head, and so exercising the spinal muscles. Is it not possible that we injure the spines of our children by the use of chairs at too early an age?

In the kindergarten the greater part of the time is spent on the floor, with good results. Would it not be better to have no seats for school-children under eight years of age? When we notice the way infants are propped up in perambulators, instead of lying flat, we can quite understand how many a weak back is started.

Of 19,066 schoolboys examined, 4·1 per cent. were found to be scoliotic; and of 13,356 schoolgirls, there were 5·8 per cent. suffering the same way. I explain the difference of 1·7 per cent. as due to the extra bad postures of the girls whilst sewing.

The spine consists of a flexible column made up partly of bone and partly of cartilage. Below, it is wedged firmly into the pelvis, which is supported on two equal columns, the lower limbs. It carries the head, and bears the weight of the upper limbs, the thorax, and abdomen, besides their contents.

The erect spine regarded from the front or back should be perfectly vertical, any deviation to the right or left giving rise to scoliosis, or lateral curvature. Viewed from the side it is seen to possess four curves —cervical, dorsal, lumbar, and sacral. When the dorsal curve is exaggerated it produces kyphosis; the term "lordosis" is applied to a similar enlargement of the lumbar curve. Scoliosis is always accompanied by rotation; in many cases it is combined with varying amounts of kyphosis and lordosis. These latter conditions are well marked in the round shoulders and prominent abdomen which are invariably associated with lateral curvature.

The spine is kept erect by the equal antagonism of the muscles connected with its two sides. This action may be likened to the manner in which a ship's mast is kept in position by the stays. Should these latter be tauter on one side, there will be an inclination to that side. Most people are right-handed, the right side is more developed, the muscles on the right of the spine are stronger than those on the left, and the spine becomes inclined to the right, causing the right shoulder to be lower than the left. The cervical and lumbar curves may be likened to a bow, the bending of which depends on the tension of the string, here represented by the muscles. When the back-muscles contract they have a primary effect on the cervical and lumbar, and a secondary effect on the dorsal curve. There is little rest for the spine during the day, as its equilibrium in the erect position is constantly varying.

The school postures of standing, sitting, and writing, besides school games exercising only one side of the body, are largely responsible for the prevalence of scoliosis. To understand this it will be necessary to explain the mechanism of these postures.

The Standing or Erect Position.

In this position the long axis of the trunk should be at right angles to the axes of the hips and shoulders. With the feet close together the centre of gravity should fall just between the feet, and an equilibrium will be maintained. If one limb should be shorter than the other the pelvis will be tilted to that side.

We have already seen that the spine is fixed into the pelvis at right angles to the latter's transverse axis. If, then, the pelvis is tilted, the spine will be inclined to that side, the centre of gravity will fall outside the base formed by the feet, and there will be a tendency to fall to that side. To prevent this the spine curves itself towards the opposite side, until equilibrium is restored. In such a case the shoulders, being at right angles to the spine, will be tilted in an opposite direction to that of the pelvis. For example, in the case of a person who, as the result of fracture, has marked shortening of the right femur, when he stands his pelvis will be tilted to the right, the spine will curve to the left to maintain an equilibrium, and his left shoulder, in consequence of this spinal curve, will be lower than the right. A similar condition is brought about by standing with all the weight on one leg, a common habit amongst children and adults. A bad standing position, with the side of the pelvis tilted, causes lateral curvature of the spine. This can be prevented by standing with the feet apart, so that the weight of the body is equally distributed.

A somewhat similar condition ensues when the equilibrium of the body is interfered with by carrying school-books. The ordinary leather school-bag weighs about 1 lb.; the weight of the books carried, from 1 lb. to 7 lb. and over. Infants are not supposed to carry books. The child of eight starts carrying a weight of 2 lb.—1 lb. of books and 1 lb. bag—and this weight increases at an average rate of 1 lb. per annum. At this rate the child of fourteen has a burden of 8 lb. to convey daily to and from school. This weight is habitually borne in the same hand, the equilibrium is altered, and a scoliosis is slowly developed. Books should not be carried; duplicates might be kept at home. Should this not be possible, the school-bag should be slung from both the shoulders.

The Sitting Position.

In sitting, the equilibrium of the body can only be maintained without muscular effort when the centre of gravity is immediately over the hip-joint axis. If it be behind, the body falls backward, and can only be kept at rest by the action of the flexors of the hip-joint and the anterior abdominal muscles.

If the centre of gravity be in front, the body tends to fall forward until arrested by contact with the thighs; this falling forward is prevented by the tension of the hamstring-muscles. When the knees are extended these muscles become more tense, and the pelvis cannot slope forward. With the knees stretched it is difficult to touch the toes on account of the tension of the hamstrings; with the knees bent it is easy to do. Whilst sitting with the legs dangling or the toes just touching the floor it is difficult for the child to balance the body without a continuous muscular effort. A foot-rail at a suitable distance, allowing the knees to be bent at one and a half right angles, will tend to keep the pelvis up without effort. Riding is less fatiguing with than without stirrups. One sits more comfortably and more steadily in a railway-car when one is able to rest the feet in such a manner that the knees are at the angle described. In crossing the legs, the tension of the hamstrings in the upper leg is kept up without exertion and the erect position of the pelvis is readily maintained.

Every chair, at least during the time of education and growth, requires a properly constructed back to support the spine. The lumbar curve is maintained by muscular effort, which soon gives rise to fatigue; the tired lumbar muscles relax and give rise to a certain amount of relief. Without a chair-back the child is able to sit erect for a short time. Very soon it tires, the lumbar curve is lost, and a kyphotic curve is developed in its place. This curve is unsightly, and a menace to health. The child becomes stooped and round-shouldered. The thoracic and abdominal cavities become diminished in size, and the function of their contents interfered with. The only remedy is to have a seat-back which fits into and maintains the lumbar curve without effort. This support must be so placed that the centre of gravity of the trunk will fall just behind the hip-joint axis, in which case the child can sit up comfortably for a long time without any fatigue. As a result of this position the chest is well thrown out and the trunk cavity enlarged. As long as the lumbar curve is maintained it is impossible to stoop.

A properly constructed chair will sustain the lumbar curve without any fatigue. Most chairs have hollow backs, or where there is a back rail the latter is generally concave forwards; it should be convex. The advantages of such a support can be easily demonstrated by sitting in an ordinary chair and leaning against the hands clasped together in the small of the back.

A seat without a back, or a badly constructed seat-back, causes round shoulders and a humped back, with their concomitant evils. The depth of the seat must be small enough to allow of flexing of the knees whilst the child is using the seat-back.

The height of the seat does not matter so long as a suitable foot rest or rail is provided, allowing of the thighs to rest in their full length and the knees to be flexed at one a half right angles. There is no necessity to slope the seat-surface.

The Writing Position.

In writing, the eye watches only the downstrokes. Vertical and horizontal lines are less fatiguing than oblique lines. The greatest amount of light should be from the left. How a child should sit and how the seat should be constructed has already been explained.

When the child bends forward to write, the advantage of the back support is lost; the child rests on the forearms, and the back becomes humped. This can be prevented by the edge of the desk overlapping the seat and coming nearly in contact with the child's body. The height of the desk should be such that when the child sits perfectly erect both elbows can readily rest over the edge without raising the shoulders. The imaginary line joining the two elbows should be parallel with the upper and lower edges of the desk. There should be no beading on the lower edge, otherwise the ulnar nerve becomes compressed, and numbness set up. The inclination of the desk should be equal to an angle of about 30°. The writing-paper should be placed obliquely on the desk, so that when the right hand is in position the right forearm will be parallel to the right and left edges of the paper. The left hand is of use in keeping the paper steady.

When the above directions are carried out the child will sit erect without any muscular effort, both elbows will be square on the desk, the paper will be inclined to the left, and the right hand, in writing, will describe an arc of a circle of which the elbow is the centre. There will be no twisting of the spine or advancing of the shoulder. The eyes will not be fatigued, the vertical downstrokes will be oblique on the paper.

Unfortunately, the child is not properly taught, and therefore assumes a very bad writing position. The writing-paper is placed with its edges parallel to those of the desk. The left shoulder is advanced so that the left elbow is well in front of the right. It is very often taught that the penholder must be inclined towards the right ear. The twisted body has to follow the movements of the pen from left to right and back again. When the light comes from the back the contortion becomes still more aggravated, in order that the shadow on the paper may be as little as possible. A bad writing posture always predisposes to lateral curvature of the spine, with marked rotation.

It is most important that the educational authorities pay more attention to the fact that spinal curvatures are generally developed during school life, and that they can be easily prevented by proper supervision and the provision of suitable school furniture.

SECTION OF PUBLIC HEALTH AND STATE MEDICINE.

THE PROPHYLACTIC USE OF SENSITIZED BACTERIAL VACCINES IN PUERPERAL SEPSIS.

SUGGESTIONS FOR THE NEW ZEALAND GOVERNMENT HEALTH DEPARTMENT.

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ARNOLD LEA(1) mentions three main factors which must be observed to secure a further diminution in puerperal infection and mortality. These are—(1) Complete disinfection on the part of those attending the lying-in woman; (2) the efficient disinfection of the external parts during labour, and the maintenance of cleanliness during the first ten days after delivery; (3) the limitation of examination, and the avoidance of operative interference as far as possible.

Several cases of puerperal sepsis which have recently been brought to my notice, and in which all these precautions were faithfully observed, have led me to investigate the subject with a view to prophylactic treatment.

Before discussing the prophylactic use of sensitized vaccines in maternity work as a public health measure, I will, with your permission, briefly consider the bacteriology of the female genital tract during pregnancy and the puerperium.

Bacteria of Female Genital Canal during Normal Pregnancy.

A great deal of research has been devoted to the study of the bacterial flora of the female genital canal during pregnancy, and many contradictory reports have been published. It is well known that the vulva and vagina, and even the urethra, may contain a very varied flora during normal pregnancy, but, in the main, research has been devoted to the detection of organisms which may be capable of producing infection. It is obvious that if such are present, there are considerable possibilities for infection of the uterus during or shortly after labour. The pyogenic organisms usually found singly or in combination are various *Streptococci*, *Staphylococci*, and the *Bacillus coli*, and these are accompanied by a varying number of saprophytic bacteria.

The streptococcal group is probably one around which the most divergent opinions arise; and while some workers report the presence of *Streptococci* in 10 to 30 per cent. of cases, others, including Kronig(2) and Whitridge Williams(2), assert that if sufficient precautions are taken no pyogenic organisms, excepting occasionally the *Gonococcus*, will be found in the vagina during pregnancy. Kronig(2) has, however, in a later paper demonstrated the presence of *Streptococci* in 20 per cent. of cases.

It is, I think, now generally accepted that the divergent results hitherto obtained were due to the methods employed, and that by the use of suitable culture-media *Streptococci* can be detected in the vagina in a considerable proportion of pregnant women. A study of several of our recent cases supports this view, for it seems impossible otherwise to explain the streptococcal infection from which they suffered.

The lower part of the cervical canal may contain organisms, but these do not appear to be able to penetrate the protective zone of the cervical secretion during pregnancy.

The cavity of the uterus is sterile during normal pregnancy. We have thus seen that even in a normal pregnancy there lie serious possibilities in the lower genital canal; and it is these possibilities, and the accidents which happen from time to time, that have led me to bring forward certain suggestions for your consideration.

Bacteriology of the Genital Tract during Normal Puerperium.

The lochial discharge was formerly believed to be sterile in the early days of the puerperium. According to Lea(1) organisms frequently ascend into the uterine cavity after the first forty-eight hours, and from the fourth to the ninth day are present in considerable numbers. The organisms are mainly the saprophytic bacteria of the vagina, but very frequently organisms indistinguishable from those causing wound-infection are also present, and these include *Streptococci*.

Lea further states that with the technique usually employed it is impossible to avoid contact with the secretion in the lower part of the cervical canal, and that the cavity of the uterus itself is sterile in a greater proportion of cases than would appear from the published reports.

Sidebotham and Lea(3) investigated fifty-eight cases, and found pyogenic organisms in the early days after delivery in the uterus in 80 per cent. of cases, but of these 90 per cent. were uninfluenced by the organisms. These results have been questioned by Western(4), who quotes from a paper by Foulerton and Bonney(5). The latter workers found, with the technique they employed, that the uterus was sterile in 100 per cent. of normal puerperia, though they examined only twelve cases. Western points out that the technique employed by Lea and Sidebotham is open to objection, while that of Foulerton and Bonney (described later) is more likely to give accurate results.

Bacteriology of the Uterus in Puerperal Sepsis.

Here we are in a difficulty as to what is to be termed a case of puerperal septicaemia. This disease is notifiable in New Zealand, but as far as I am aware no standard is adopted by the Health Department; and if we take the term to mean an infection of the blood-stream, then it would be necessary to take blood-cultures before notifying a case correctly. The standard suggested by the B.M.A. Committee appointed in 1905 to consider puerperal morbidity includes all cases where the temperature reaches 100° F. on any two of the bi-daily readings, from one to eight days after delivery, but several obstetricians with whom I have discussed the question consider this standard too low.

While there are differences of opinion as to the bacterial content of the normal uterus after delivery, most are agreed as to the bacteriology of the uterus in puerperal infection. We have seen that in normal conditions the vagina may contain *Streptococci* and other pyogenic organisms, and the risk of one or more of these gaining access to the recently evacuated uterus is not inconsiderable.

Of the accredited organisms of puerperal infection, the *Streptococcus* is present in by far the greatest number of cases. Other organisms commonly, though less frequently, present either alone or in combination are *Staphylococci, Gonococci, B. coli,* and diphtheroid bacilli.

Since we began using sensitized streptococcal vaccines in these cases early in 1913 we have investigated fourteen cases. In twelve of these *Streptococci* were found in intra-uterine swabs or blood-cultures; in two cases associated with the *Staphylococcus aureus,* in one with the *B. coli.* In two cases only was the *Streptococcus* not found, thus making a percentage of 85·7 of cases in which *Streptococci* were isolated either from the blood or from intra-uterine cultures.

The findings in our small series of cases agree with others, Thus Schottmuller(6) found *Streptococci, B. coli,* and *Staphylococcus aureus* in that order; Jordan(7) found *Streptococci* and *B. coli* most frequently. Foulerton and Bonney(5) investigated forty cases of severe puerperal infection, and found *Streptococci* or Gram positive *Diplococci* in 77·5 per cent.; and Western(4) in forty-three cases found *Streptococci* in 80 per cent. of cases.

Laboratory Diagnosis and Technique employed in our Cases.

Medical practitioners in the Otago District are supplied on request with a special intra-uterine swab, one of which I take this opportunity of handing round. After trying various devices for taking intra-uterine cultures, we prefer the method described by Foulerton and Bonney and quoted by Western(4).

In New Zealand only a few cases came into hospital, and frequently the swab has to be taken by a practitioner in a remote country district. It is because it is applicable to the needs of the general practitioner that we find Foulerton and Bonney's method so advantageous.

The swab, as we use it, consists of a glass tube of about 4 mm. internal diameter, which is slightly bent about 5 in. from the "uterine end." In this tube is placed a wire swab with the handle-end projecting for 6 in. A mark is made on the wire handle when the swab end is just within the "uterine end" of the glass tube, and another 2 in. farther away, so that the practitioner knows just how much of the swab end is projecting beyond the glass tube when in the uterus. The uterine end of the glass tube is lightly plugged with cotton-wool, to which a string is attached. The whole swab is placed in a wide-bore test-tube plugged with cotton-wool, and sterilized in the autoclave, so as not to char the cotton-wool plug or the string attached to it. After sterilization the glass tube is momentarily removed from the test-tube, and its uterine end just dipped in sterile molten paraffin, which, when cool, forms an impervious cap.

The instructions issued with the swab outfit leave the question of preliminary douching of the vagina an open one, unless it can be carried out under hospital conditions. The uterus should be drawn down with forceps and the os exposed to view. After cleaning the os with sterile gauze the swab is passed till the end reaches the fundus. It is then withdrawn an inch, and traction applied to the string, which pulls away the paraffined cotton-wool cap. The swab is carefully pushed out of the glass tube by means of its projecting outer end, and the interior of the uterus well swabbed.

The swab is then drawn well into the glass tube, and the whole apparatus replaced in the sterile test-tube in which it is sent out. If in town the swab outfit is carried vertically to the laboratory, and if in the country it is sent to town by "express delivery," so that we get it shortly after the arrival of the train.

The extra trouble involved in taking the intra-uterine swab in this way is well repaid by the ease with which the laboratory investigation is carried out as compared with swabs as we previously received them, contaminated by vaginal bacteria. Where vaccine therapy is indicated the saving of time is invaluable, for it has been our good fortune to secure practically pure cultures by this means, not only in the series of cases which are here recorded, but in all cases which have been investigated since adopting this method of some years ago.

I have explained the method of using the intra-uterine swab at some length, in the hope that the demand by practitioners for the use of some similar apparatus may stimulate the Health Department to make the necessary provision for their distribution throughout our somewhat scattered districts.

Blood-cultures.—It has been possible to take blood-cultures only from those cases to which we could gain access, such as hospital and town patients. Of the seven cases in which this was possible, four gave positive results. No. 11 is interesting in that a *Streptococcus* and *B. coli* were recovered in intra-uterine cultures, and the same organisms were present in the blood. This was a severe case, admitted into hospital late in the disease, with several rigors daily.

Necessity for Earlier Laboratory Investigation.

One of the duties of a Public Health Department constituted as is the New Zealand Department, if it intends to deal with puerperal sepsis, is to impress on practitioners the necessity for earlier laboratory investigation. Along with this must be adequate provision for diagnosis, and for supply of the necessary vaccines or sera. Too often the laboratory and the vaccine are left as a last resort, and the vaccine used when it is almost impossible for good results to attend its administration. Every worker can testify to the gratifying results of application of laboratory treatment as an adjunct to routine treatment, when applied within the first two or three days of a septic case. If practitioners would realize this more fully I am convinced that much suffering and loss of life would be avoided, especially when sensitized vaccines are available.

Serum Therapy and Commercial Imported Sera.

We have seldom seen any benefit arise from the use of commercial polyvalent anti-streptococcal serum in puerperal sepsis, or, in fact, in streptococcal infections generally. Were freshly prepared sera available one might not be so pessimistic, but the sera as imported to New Zealand is from six months to a year old ; it has passed through the heat of the tropics, and has been stored in warehouses without any special precautions before we receive it. For this and other reasons we have practically abandoned its use in streptococcal infections.

Our experience—and I believe it is the experience of many others—with freshly prepared anti-streptococcal serum is not encouraging. One case in particular—a streptococcal endocarditis, with repeated positive blood-cultures—responded but poorly to an auto-serum which we prepared from a horse, but gave excellent results with a vaccine sensitized by the same serum.

The Therapeutic Use of Vaccines, sensitized by the Patient's Serum, in Puerperal Sepsis.

The treatment of puerperal sepsis by ordinary bacterial vaccines has been the subject of several excellent papers, and I intend to confine my remarks to the use of sensitized vaccines in this condition. The indiscriminate use of vaccines for all and sundry conditions cannot be too strongly condemned, and our practice is to weigh each case on its merits, after consultation with the practitioner in attendance. The advantages of the sensitized vaccine over the ordinary vaccine have been emphasized quite recently in papers by Broughton Alcock(9) and Gordon(10). Hitherto the treatment of cases of septicaemia by vaccines has been attended by some risk, and by not altogether satisfactory results, although Western claims to have reduced the mortality of notified cases of puerperal sepsis from 60 per cent. to 30 per cent. by the use of ordinary vaccines. By substituting the sensitized vaccine a safer and more rapid immunization is secured. Not only is the reaction to injection almost if not quite eliminated, but the response to treatment more rapid, provided, of course, that sensitization is complete.

Besredka and his pupils now use living sensitized vaccines, but Gordon(10) is more cautious, and kills his cultures, a practice which we have deemed it wise not to depart from. The preparation of the sensitized vaccine is more tedious than is the case with the ordinary vaccine, and it deteriorates more rapidly, so that where stock sensitized vaccines are used they must be made up at frequent intervals, and kept in as high a concentration as possible.

Preparation of the Vaccine.—Where a supply of fresh polyvalent anti-serum is always available, stock vaccines can be sensitized and kept ready for use, or an autogenous vaccine may be sensitized. As I have already pointed out, we are unfortunately situated in this respect in New Zealand, and require to make our own anti-sera.

Moreover, in the case of the *Streptococcus*, it takes several months, with our limited supply of clinical material, to collect sufficient strains of *Streptococci* from which to prepare a satisfactory polyvalent serum. The time involved cannot well be spared in our laboratories, where assistance is meagre, and duties manifold. We first sensitized our streptococcal vaccines with an anti-streptococcal serum prepared from a horse for a case of endocarditis, but as this was prepared from the patient's own *Streptococcus* (an anaerobic variety), with only twelve other strains, the serum did not always sensitize satisfactorily. We confined our attention to streptococcal infections in the first place, but have recently extended the method to include other infections, using the patient's serum for sensitization.

The bacterial emulsion is heated to 56° C. for ten minutes in the water-bath, and then 5 c.c. mixed with 1·5 to 2 c.c. of patient's serum, as soon as possible after the necessary blood (4 c.c.) is withdrawn. The mixture is placed in the incubator at 37° C. for twelve hours, and then kept on ice for twelve hours, before being washed and standardized to 2,000,000,000 organisms per cubic centimetre. This emulsion is kept in the ice-chest, and diluted to suitable doses shortly before use.

This method was adopted with the streptococcal cases in our series with fairly satisfactory results. The principal objection lies in the fact that we have seldom found sensitization complete, while some cases seem to form very little antibody in response to infection. Although the sensitization is not usually complete, we have found that a case of streptococcal puerperal septicaemia of moderate severity can be given an initial dose of 100,000,000 auto-vaccine, and this dose doubled in forty-eight hours, and this again in another forty-eight hours, without more than a slight reaction, and with beneficial results to the patient. We have not been able to exceed an average dose of 500,000,000 *Streptococci* without reaction in this class of case, although in other conditions does of 2,000,000,000 can be borne with comfort.

Allen(11) mentions the possibility of sensitizing vaccines with the patient's serum, and briefly refers to several cases he has treated. It is a method to which an extended trial might well be given by those with sufficient clinical material at their disposal. We should prefer a good polyvalent anti-serum where this is procurable, but, failing this, the substitute offers considerable advantages over ordinary vaccines. We have used it in a number of infections due to *B. coli*, and in pyorrhoea and chronic bronchitis, with encouraging results. One long-standing case of the latter which failed to respond to ordinary vaccines cleared up completely, and has remained well for six months, with an auto-sensitized vaccine. All the cases in which this method has been exhibited agree in the absence of reaction until large doses are reached.

Prophylactic Use of Sensitized Streptococcal Vaccines in Midwifery Practice, from a Public Health Point of View.

We were first led to try the effect of streptococcal vaccines with the patient's own serum in a small outbreak of five cases of puerperal sepsis in a nursing-home. The first case of the series was a carefully conducted and easy confinement in a well-to-do multipara. As far as can be ascertained, no vaginal examination was necessary or was made. On the sixth day the patient developed a temperature of 104–105° F., which continued for several days, accompanied by severe rigors. Blood-cultures taken at the highest point of the temperature were negative, but an intra-uterine swab showed numerous *Streptococci* and a few colonies of *Staphylococcus aureus*.

A stock sensitized streptococcal vaccine was given, until an autogenous vaccine was sensitized against the patient's serum. Doses of 100,000,000, 200,000,000, and 400,000,000 of this latter were given at 48-hour intervals, and the temperature dropped to 99–101° F. A further dose of 500,000,000 auto-vaccine caused a rise of temperature to 105°, and the patient lost the ground she had gained.

Smaller doses of the vaccine (300,000,000) were then combined with doses of 100,000,000 and 250,000,000 of an autogenous vaccine of the *Staphylococcus aureus* isolated, when the temperature fell to normal, and the patient made a good recovery.

Four other cases that were in the home awaiting confinement contracted the infection, although extra precautions were taken. Two of these cases reacted sharply to doses of 200,000,000 of vaccines sensitized against their own serum, but a stock sensitized streptococcal vaccine was well borne. Both cases ran a protracted course, and eventually recovered.

The remaining two cases due at this time were confined with every care, but the auto-sensitized vaccine prepared for the previous patients was held in readiness. Both cases developed temperatures of 103–104° soon after confinement, and the vaccine was immediately given (100,000,000). The effect in both cases was most marked—the temperature dropped within six hours, and remained at normal, while further doses of 200,000,000 and 400,000,000 were given as a precaution.

Uterine swabs in all five cases gave apparently the same *Streptococcus*, resembling the *Streptococcus pyogenes*, with the exception that lactose was not fermented.

The practitioner was so struck with the immediate improvement in these two cases that all the cases in the home were given prophylactic doses, and no further infection occurred.

The marked improvement in these two latter cases, and the cessation of further cases in the home, suggested the value of prophylactic treatment, and it is for this reason that I have brought the matter forward for your consideration. I realize that the indiscriminate use of vaccines in maternity practice would not be advisable, but I suggest that in certain circumstances this course would not only be beneficial, but a duty.

My suggestions are as follows :—

(1.) In view of the fact that our Health Department already issues anti-typhoid vaccine to hospitals and the profession through one of its laboratories, and that diphtheria antitoxin is supplied by certain Hospital Boards free for indigent patients, the Department should extend the scope of this branch of preventive medicine, and issue sensitized streptococcal vaccines for prophylactic use in maternity practice. The vaccines could be prepared at one of the Department's laboratories, and distributed by the District Health Officers to the Hospital Boards in their districts.

(2.) In view of the fact that 80 per cent. of cases of puerperal sepsis are due to *Streptococci*, it would be well to use a stock sensitized polyvalent streptococcal vaccine as a prophylactic in the face of an epidemic of puerperal infection, such as one sometimes sees in an institution, or in private practice where the house surroundings are not of the best, or where the practitioner has already recently attended a case which has gone septic.

(3.) That doses of 100,000,000, 250,000,000, and 500,000,000 of this vaccine be given the expectant mother at 48-hour intervals ten to fourteen days before the expected date of confinement.

The sensitized vaccine is preferable to the ordinary vaccine, because of the absence of reaction and the more rapid immunization.

On pp. 785–86 is a table showing particulars of the cases in this series treated to date. The inclusion of cases 9, 10, and 11, which were all severely ill on admission to hospital, has lowered the recovery-rate in the small series of cases available during the last year.

REFERENCES.

(1.) " Puerperal Infection," 1910.
(2.) Quoted Lea, " Puerperal Infection," 1910.
(3.) Proc. Roy. Soc. Med., Obstet. Section, 1909.
(4.) *Western Lancet*, 10th Feb., 1912.
(5.) Foulerton and Bonney. *Lancet*, 21st Jan., 1905.
(6.) Schottmuller, quoted in " Medical Officer Bacteriological Supplement," 3rd June, 1911.
(7.) Jordan. B.M.J., 6th July, 1912.
(8.) Broughton Alcock. *Lancet*, 26th April, 1913.
(9.) Gordon. *Lancet*, 28th June, 1913.
(10.) Allen. Jnl. Vaccine Therapy, July, 1913.

TABLE SHOWING PARTICULARS OF THE CASES IN THIS SERIES TREATED TO DATE.

No.	Infecting Organism.	Blood-culture.	Intra-uterine Swab.	Specific Treatment commenced after Delivery.	Rigors.	Results and Remarks.
1	*Gonococcus* (diphtheroid bacillus)	Negative ..	*	6 weeks ..	o	Auto-vaccine; recovery. Relapse; vaccine repeated. *Recovery.*
2	*Staphylococcus aureus* and diphtheroid bacillus	Not examined	*	3rd day ..	*	Temp. gradually fell from receipt of vaccine. *Recovery.*
3	*Streptococcus* (actively haemolytic)	,,	*	2 weeks ..	*	Temporary improvement with auto-sensitized vaccine. Pelvic abscess developed. *Death.*
4	*Streptococcus* (haemolytic). *Staphylococcus aureus*	,,	*	6th day ..	†	Cure completed with auto-sensitized *Strep.* vaccine and auto-*Staphylococcus. Recovery.*
5	*Streptococcus* (haemolytic). Same as 4	Negative ..	*	12th day ..	†	Rigors frequent. Marked reaction to auto-sensitized vaccine. Vaccine stopped. *Slow recovery.*
6	*Streptococcus* (haemolytic). Same as 4 and 5	,, ..	*	,, ..	*	Marked reaction auto-sensitized vaccine. Improvement with stock sensitized vaccine. *Recovery.*
7	*Streptococcus* (haemolytic). Same as 4, 5, and 6	Not examined	*	1st day ..	* 6 hours after delivery	Sensitized vaccine from No. 4 used. Immediate improvement. *Recovery.*
8	*Streptococcus* (haemolytic). Same as 4, 5, 6, and 7	,,	*	,, ..	*	Sensitized vaccine from No. 4. Immediate improvement. *Recovery.*
9	*Streptococcus* (haemolytic)	*	*	2 weeks ..	†	Both hospital cases. Admitted severely ill, with frequent rigors. Auto-sensitized vaccines without reaction to big doses, but temporary improvement only. *Both cases died.*
10				10 days ..		

* Positive. † Rigors daily.

TABLE SHOWING PARTICULARS OF THE CASES IN THIS SERIES TREATED TO DATE—*continued.*

No.	Infecting Organism.	Blood-culture.	Intra-uterine Swab.	Specific Treatment commenced after Delivery.	Rigors.	Results and Remarks.
11	*Streptococcus* (slightly haemolytic), *B. coli*	* Both present	* Both present	8 days ..	†	Tear into rectum. No sphincter control. Temp. 104–106°, and three or more rigors daily on admission to hospital. Double auto-sensitized vaccine. Rigors fell to one daily and temp. lowered. This good effect lasted several days. Relapse. *Death.*
12	*Streptococcus* (not haemolytic). *Staphylococcus aureus*	* Staphy. aur. only	* Both organisms	3 days ..	*	Stock sensitized vaccines followed by auto-sensitized *Strep.* and auto-*Staphylococcus*. Attack cut short. *Recovery.*
13	*Streptococcus* (slight haemolysis)	Negative ..	*	3 weeks ..	*	Phlebitis both lower limbs. Auto-sensitized vaccine. *Recovery.*
14	*Streptococcus* (haemolytic) ..	Not done ..	*	After 3 months abortion, 7 days	*	Auto-sensitized vaccine prepared. Temperature lower after intra-uterine douches. Pneumonia threatened. Recovered spontaneously. Vaccine not required.

Streptococcal incidence .. .. 87 per cent.

* Positive. † Several rigors daily.

METALLIC CONTAMINATION OF CANNED FRESH HERRINGS.

By Everitt Atkinson, M.B., Ch.B., D.P.H., M.A.

I offer no apology for bringing this subject before the section, because it seems to me that since the report of Drs. Buchanan and Schryver to the Local Government Board in 1908 too little attention has been given it.

I have, however, made my paper as short as possible. My attention has lately been drawn to, and my interest aroused in, the question of tin-contamination by the discovery in Western Australia of large consignments—not confined to one brand only—of fresh herrings, which, though apparently of recent date, show very extensive corrosion of the tin lining of the cans, and the presence in the fish of what I consider excessive quantities of tin; and quantities, moreover, which very markedly exceed the standard of safety laid down by the above investigators.

It is common knowledge that such canned articles of food as meat extracts, crabs, lobsters, shrimps, pineapple, and cherries, and other acid fruits, frequently do contain large quantities of the metal, but I have seen no reference to, nor had I until recently any personal knowledge of, the fact that fresh herrings were able to actively corrode tinplate.

My attention was first drawn to the subject by the submittal to me of several tins of herrings from a charitable institution in Perth. These tins, on shaking, gave out a sloshy sound which has been described as an accompaniment of corrosion and tin-contamination.

On opening there was no sign of putrefaction, but all parts of the inner surface of the tins were extensively corroded; and where the fish had been in contact with the container it had become soft and friable.

A visit was paid to the wholesale houses stocking this brand, and almost without exception their stocks showed very large percentages of similarly affected cans. Frequently the latest consignment showed only tarnishing of the metal and a few small areas of corrosion. All other brands of fresh herring were then investigated, with the result that four were found to be in a similar condition.

Acting upon the recommendations contained in the report of Drs. Schryver and Buchanan, it has been my custom to recommend the seizure and condemnation of canned foods containing more than 2 gr. of tin to the pound, and consequently practically all the canned fresh herring on the market was held up pending further investigation.

In a few cases, where the fish was considered unsound on account of excessive softening, summary seizure and destruction followed; but in all other cases the owners were given an opportunity to consult their shippers, whilst the respite was utilized by the Department to make numerous analyses of samples.

In order to justify the detention, and also to obtain information which might be of permanent value to the officers of the Department, the following procedure was adopted: One dozen tins were taken promiscuously from six to twelve cases (one or two from each case) by an Inspector of the Department and the owner of the consignment. These tins were taken to the laboratory and opened, and the fish from each was emptied (without scraping) into a clean numbered basin. The tins were then closely examined, and from them six were chosen, representing, so far as the eye could be trusted, graduated degrees of corrosion; so that the best tin of the twelve was called No. 1 and the worst No. 6, whilst varying and ascending degrees between these were chosen and numbered 2, 3, 4, and 5 respectively. The fish, in numbered basins, was then submitted to the Analyst for tin and lead estimation, with a request that any particles of solder large or small be removed before analysis.

It was considered that the above procedure would be instructive in that it would not only supply definite information regarding the quantities of metal contained in the fish, corresponding with varying degrees of corrosion, but it would, moreover, serve as a test of one's ability to grade degrees of corrosion. With confidence in one's discriminating power, then, one would feel more able, without analysis in every case, to act justly in the matter of subsequent seizure or detention. The experiment was, therefore, instructive to the staff and just to the trader. This method, then, was adopted in the case of four different brands of fresh herring, and the results of the analysis, together with photographs showing the extent of corrosion in these four cases, are laid before the section.

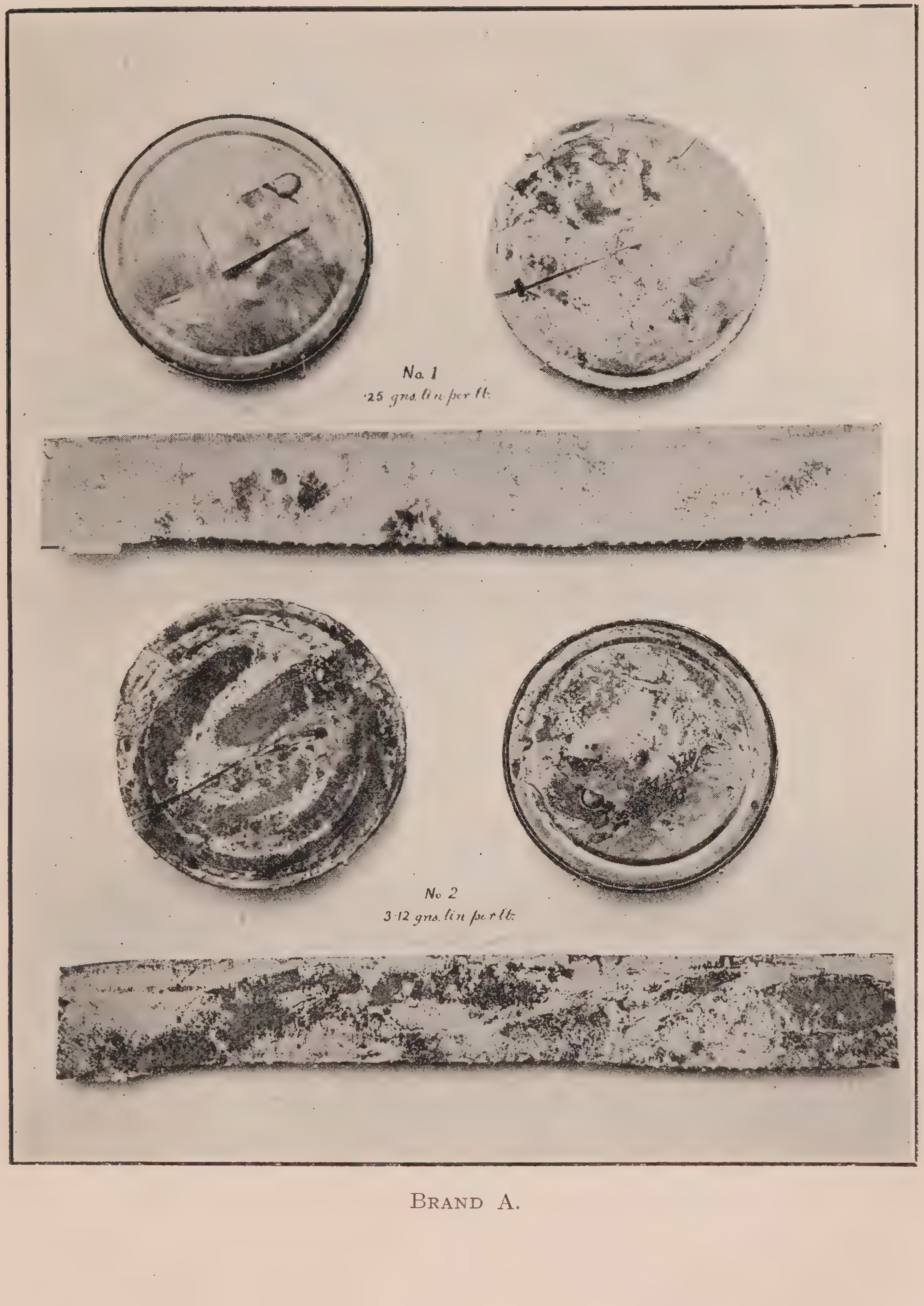
As to the definite cause of the corrosion, acidity of the fresh fish and an electrolytic action set up on account of exposure of two metals, tin and iron, at certain points where there was not perfect continuity of the tinned surface are suggested as causal factors. Whether inferior tin-plate is being used, or whether any new process has been recently adopted in tinning or canning which might account for an extent of corrosion I have only previously seen in very old tins, I leave for the consideration of those more qualified to speak than myself.

The further question as to whether there is definite evidence that tin can actually do harm to the human economy I am not prepared to discuss, but I cannot think that the guardians of the public health would be doing their duty in allowing quantities of tin exceeding 2 gr. to the pound of food to be consumed. Especially is this of grave import in the case of Western Australia, where the men in the "backblocks" have to subsist almost entirely upon this class of food.

It must be remembered that the figures given are those of the actual tin present in the fish as turned out, without scraping or detachment of small portions which adhered to the container, the object being to estimate the quantity of metal which in the household would actually be consumed. Had the remaining portions been added the figures would undoubtedly have been higher. The liquor was in each case added to the fish.

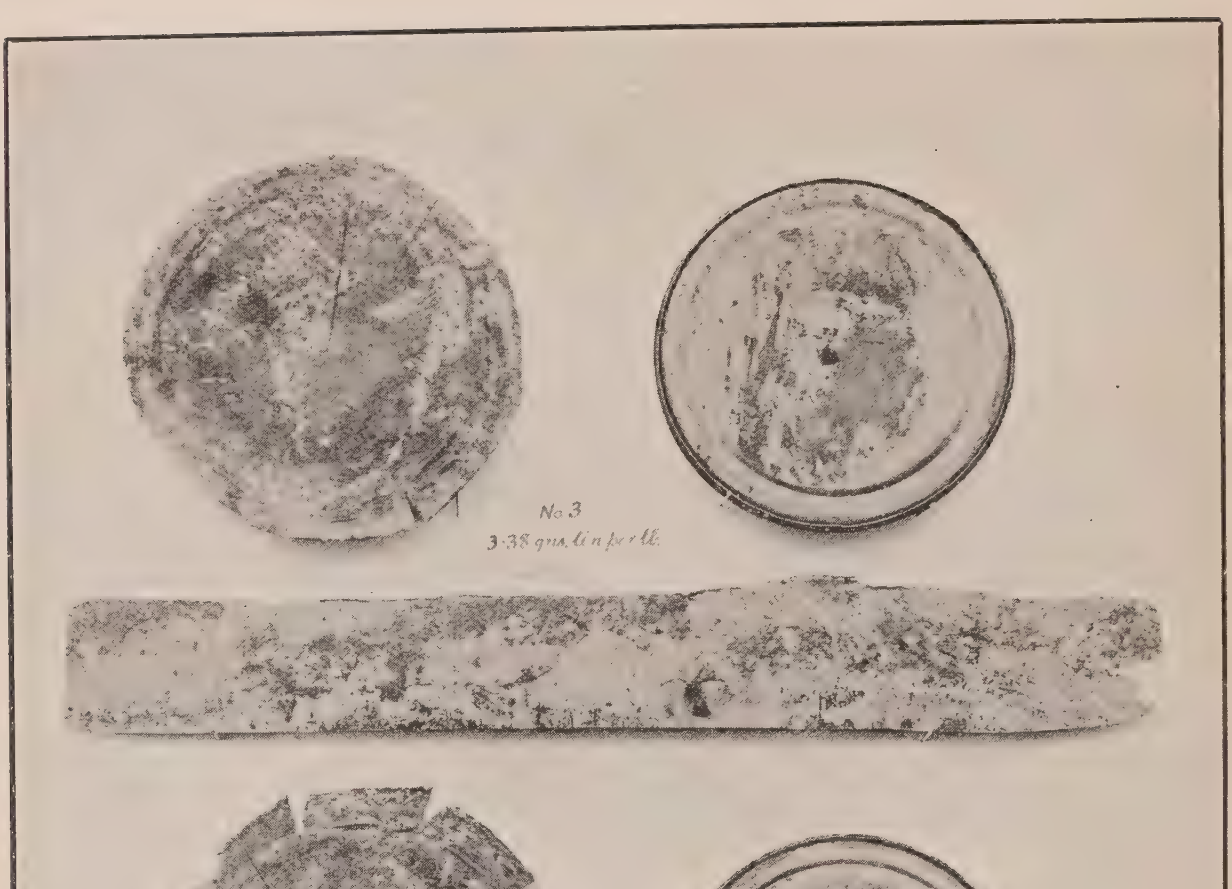
Brand A.—It will be seen that in the case of this series, as regards the amount of metal found in the contents of each can, the grading was correct. But in view of the fact that No. 2 contained only 14·94 oz. of fish, as against 15·91 oz. in No. 4, when reckoned as grains per pound Nos. 2 and 4 change places on the scale.

In the case of *Brand B* an error in grading occurred, in that No. 4 showed the highest tin-content, and should therefore have been labelled No. 6. This tin, No. 4, did not show the same extent of corrosion as

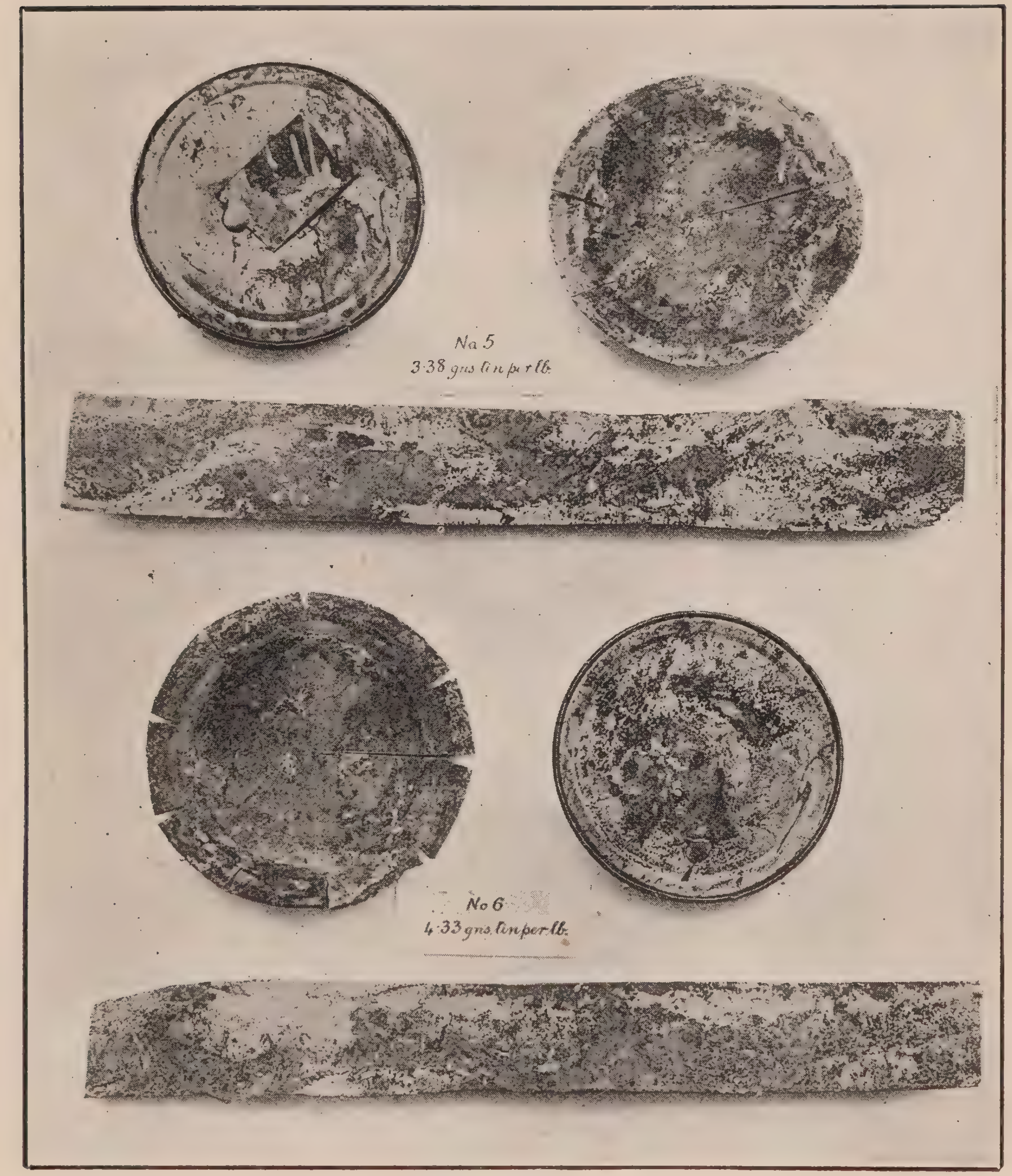


BRAND A.

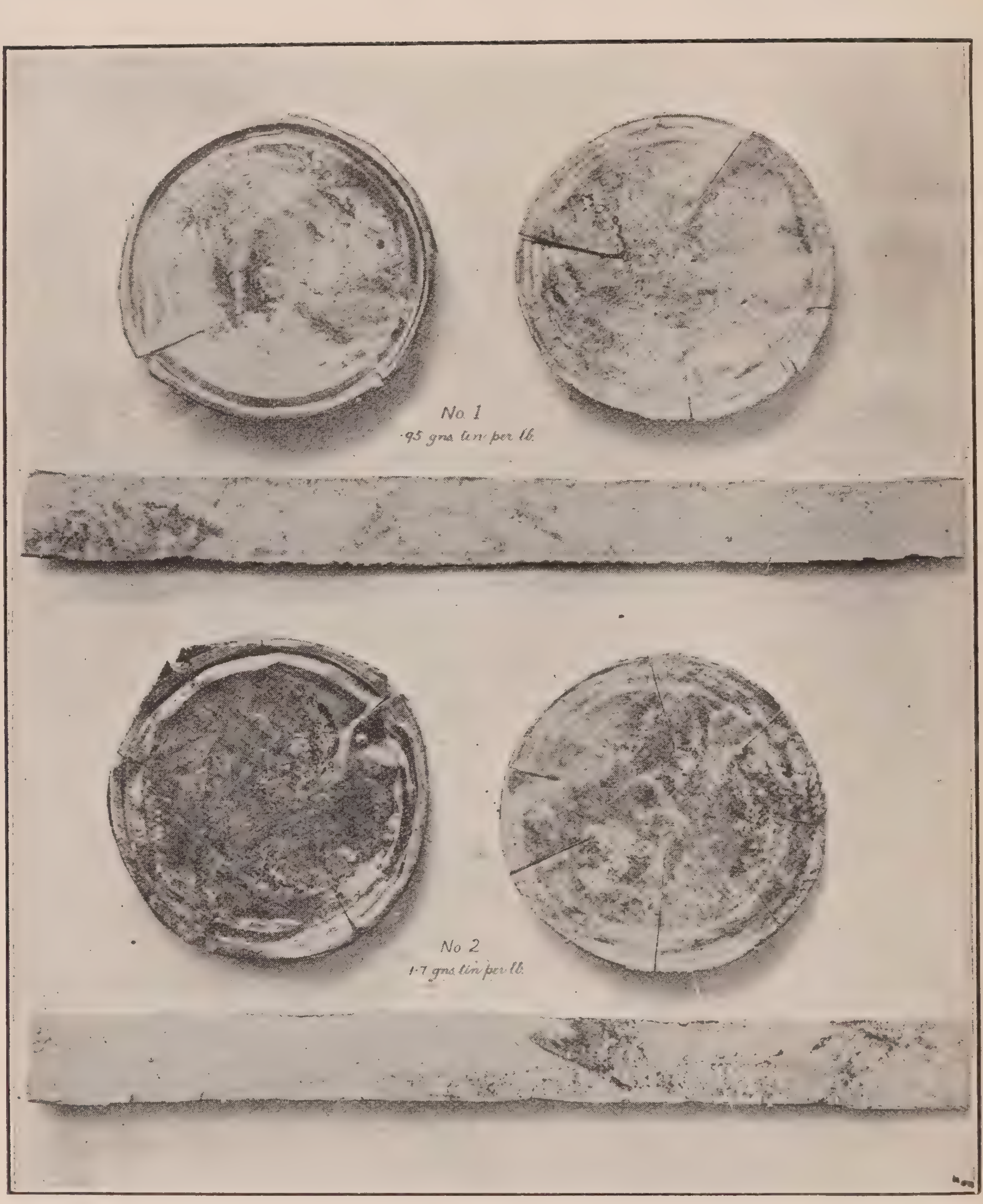
To face page 788.]



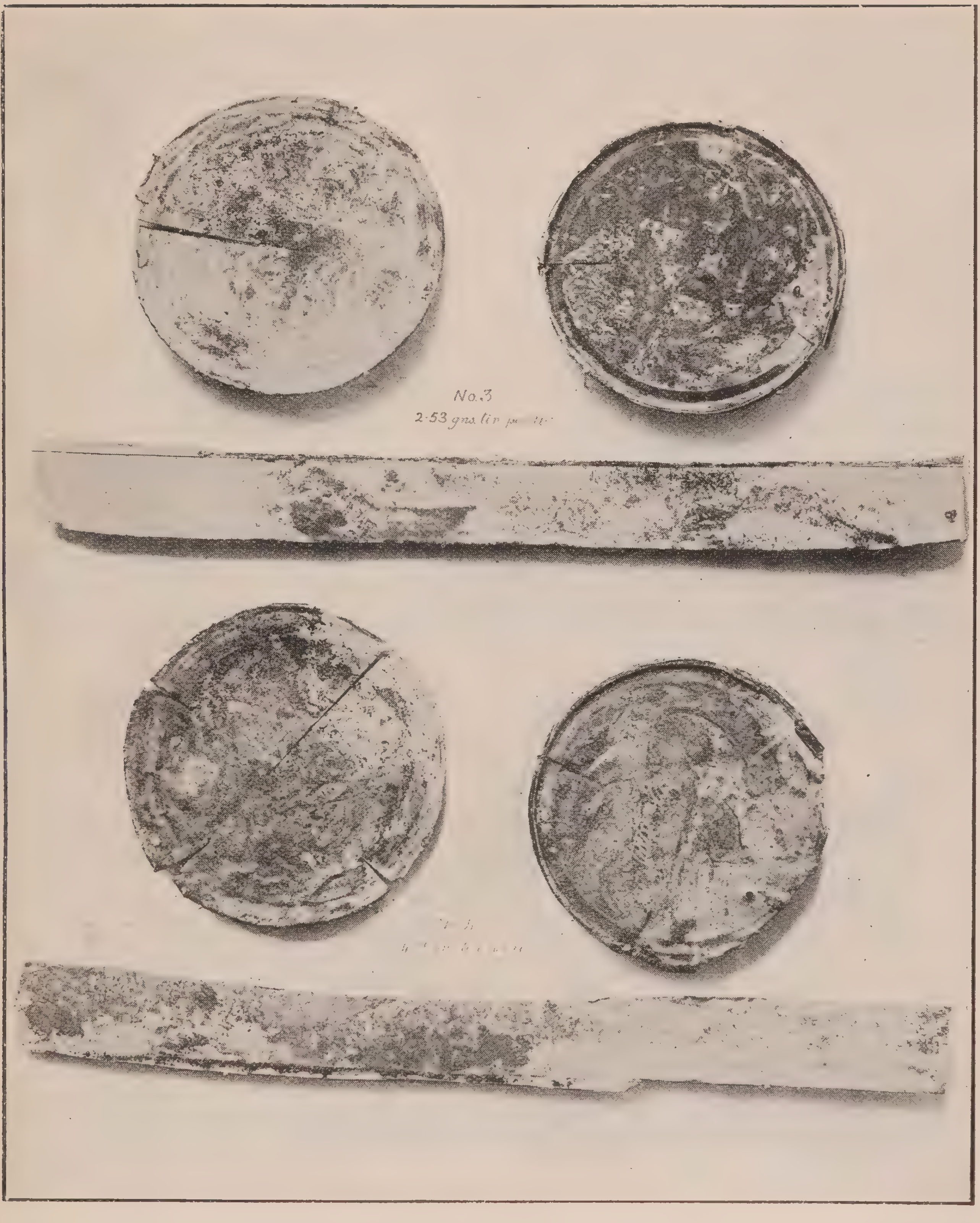
BRAND A.



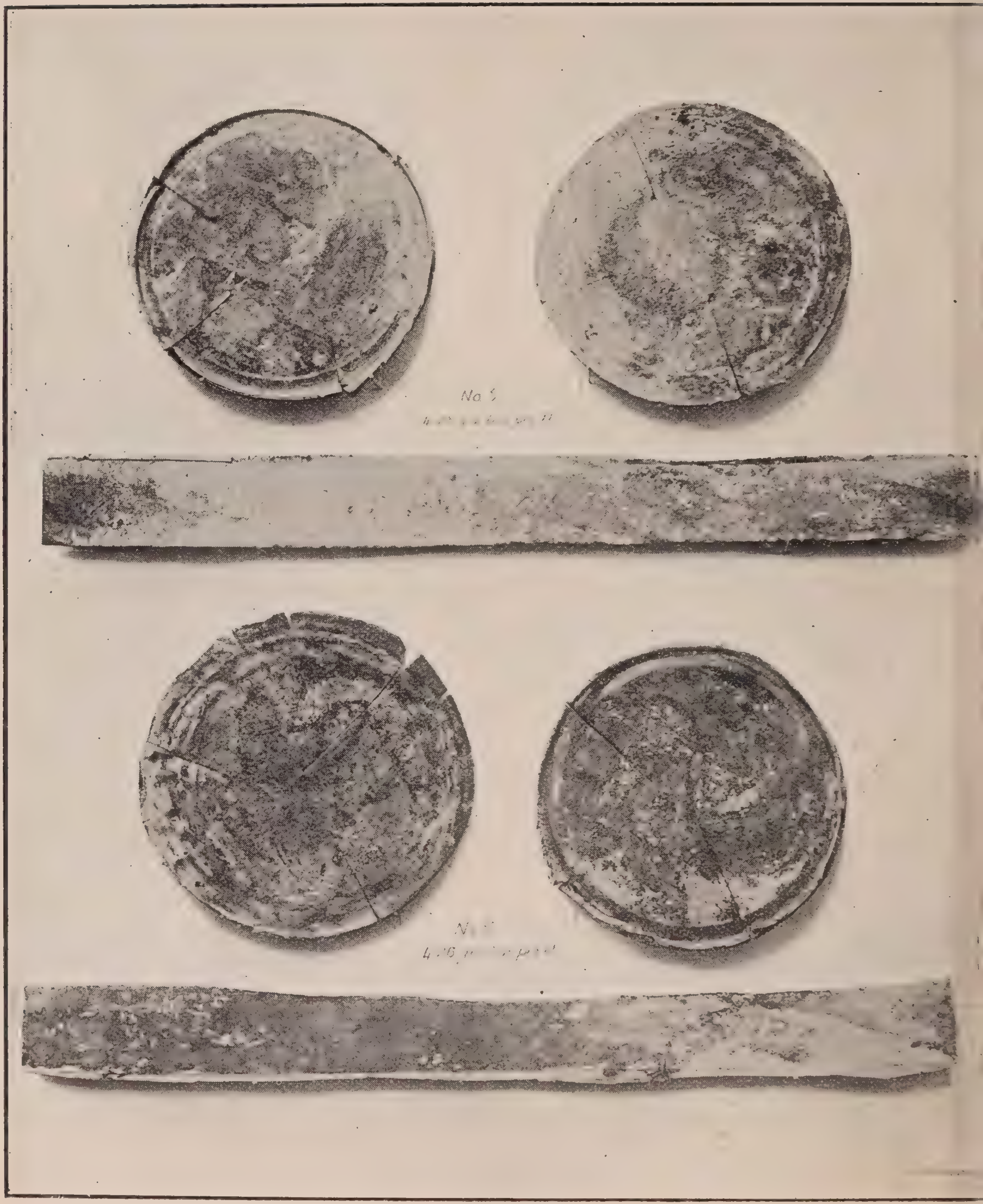
Brand A.



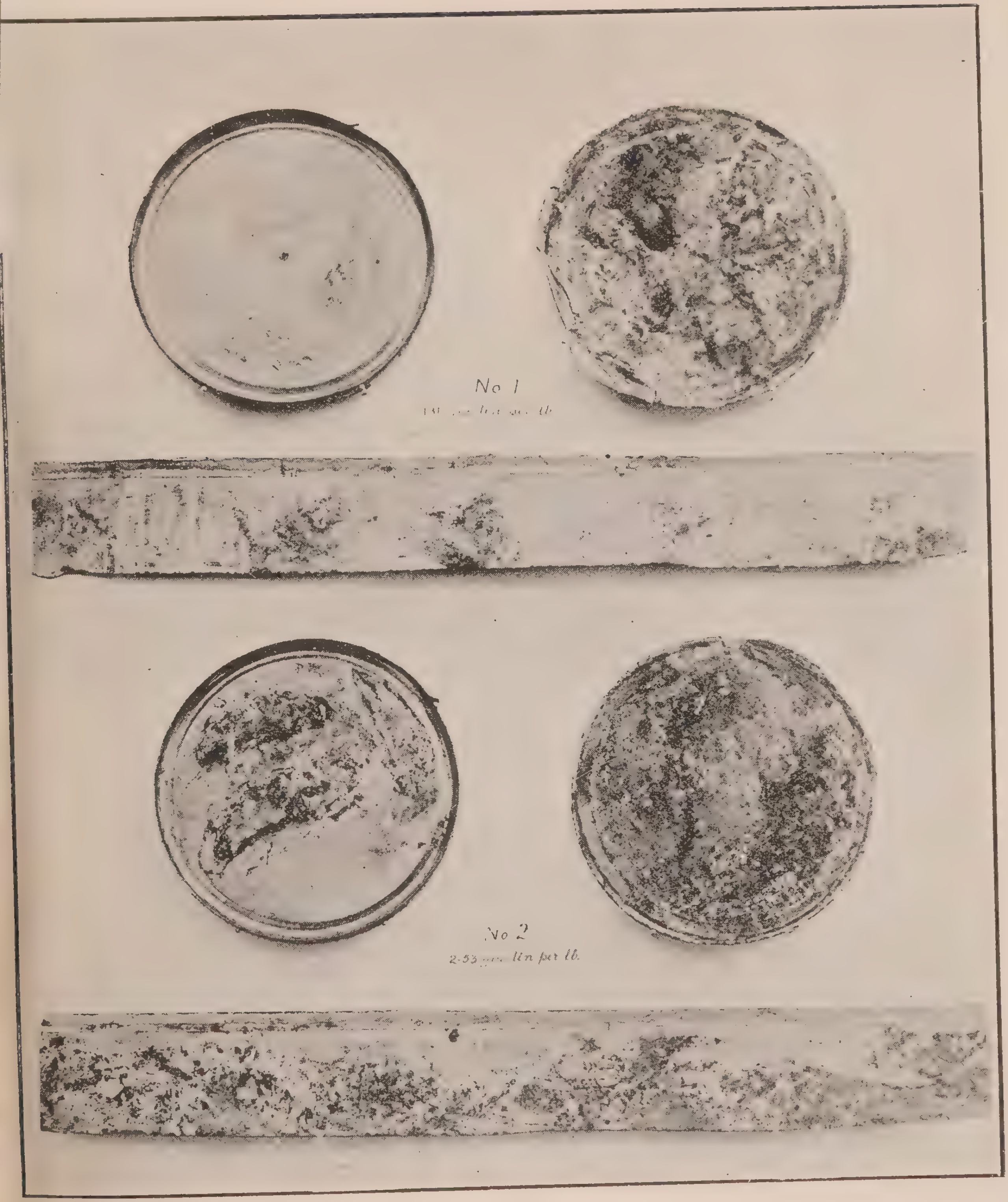
Brand B.



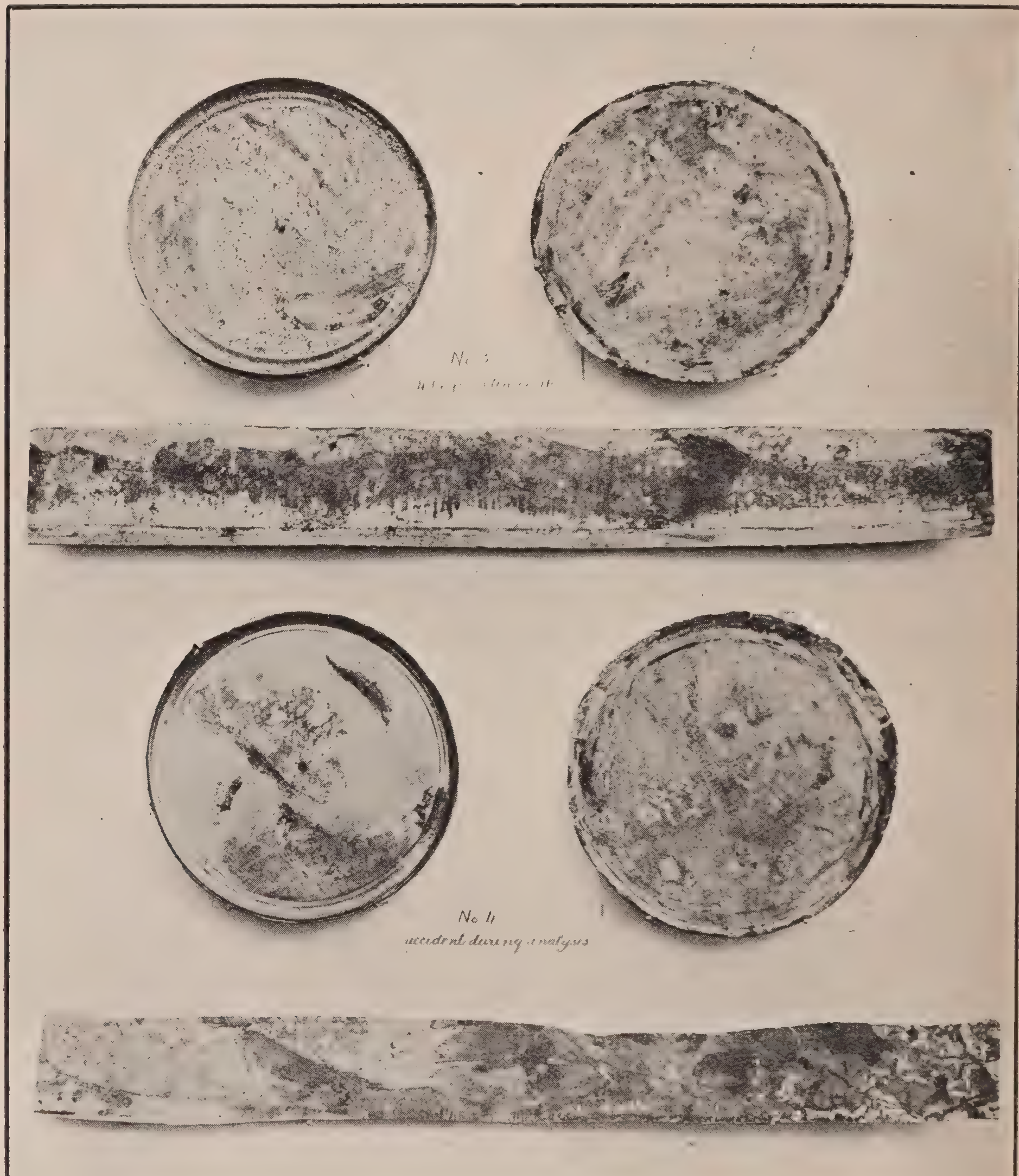
Brand B.



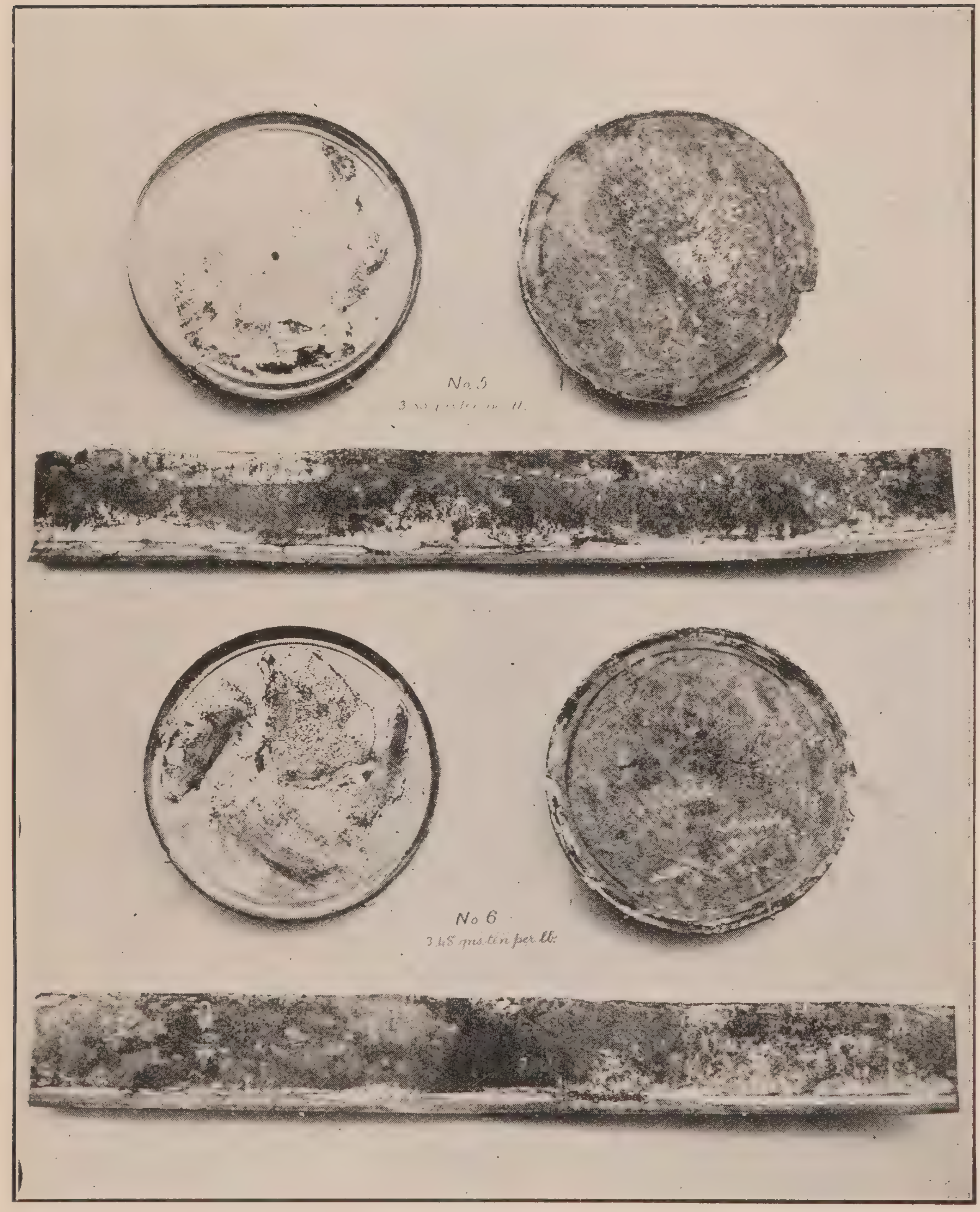
Brand B.



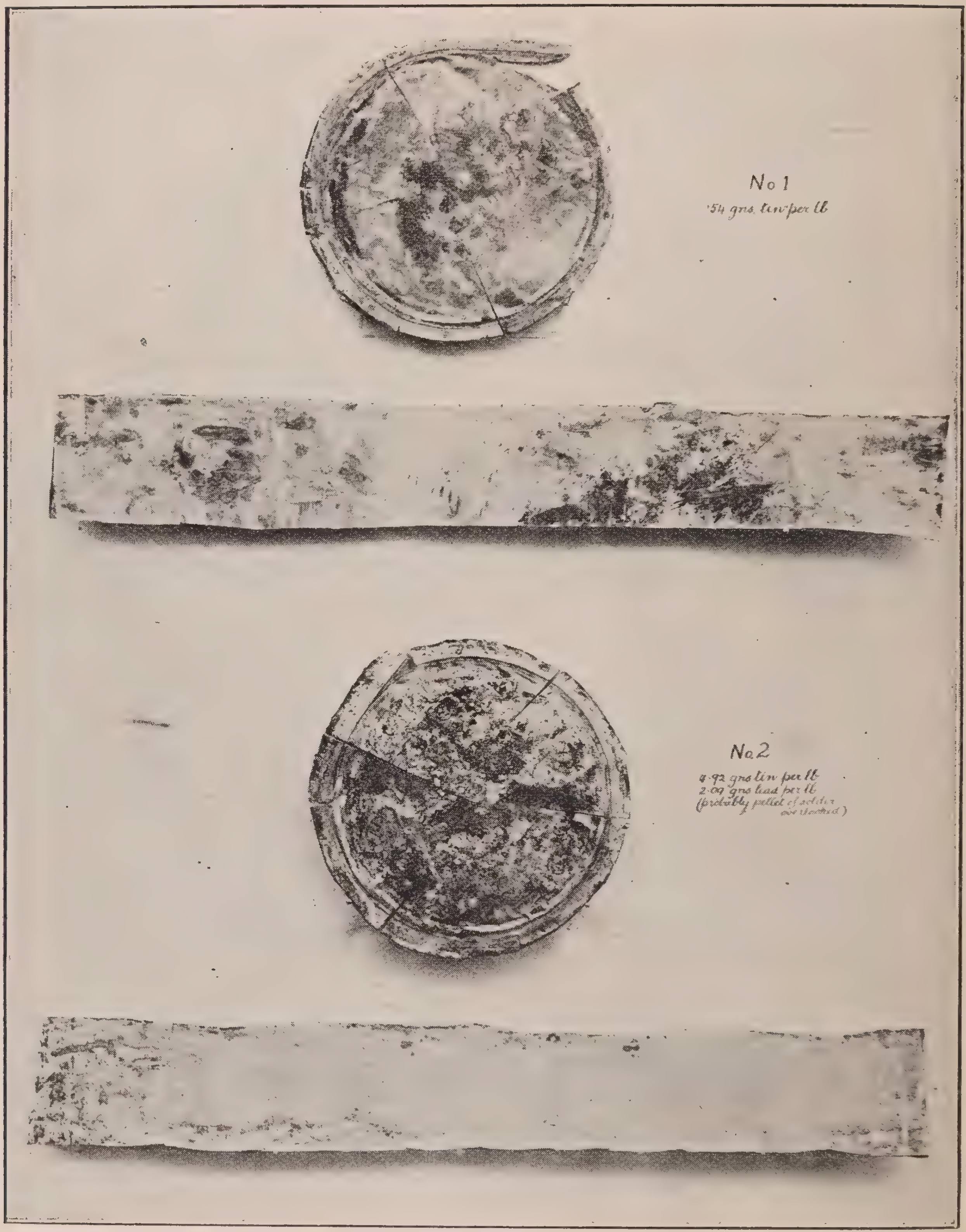
Brand C.



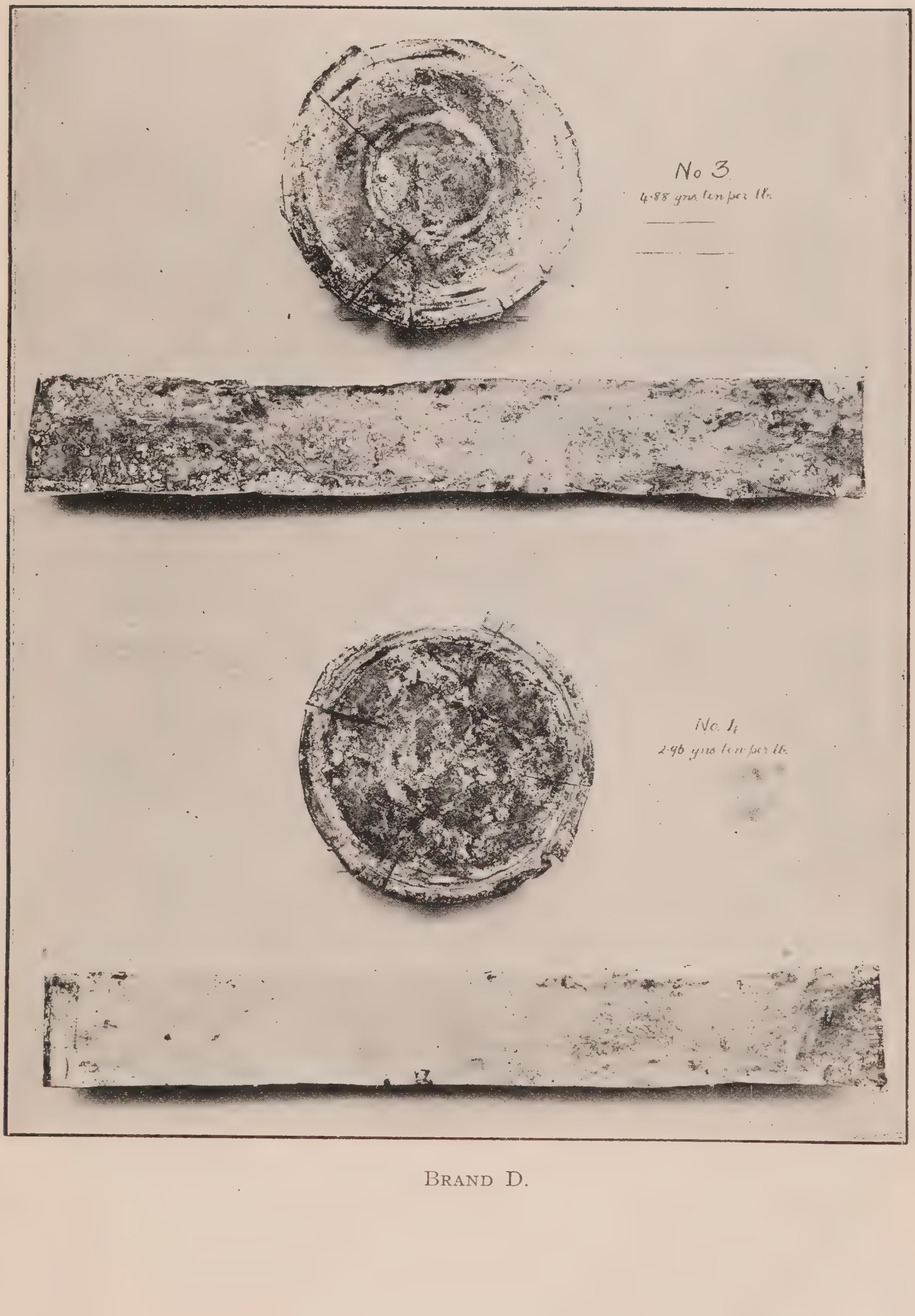
Brand C.



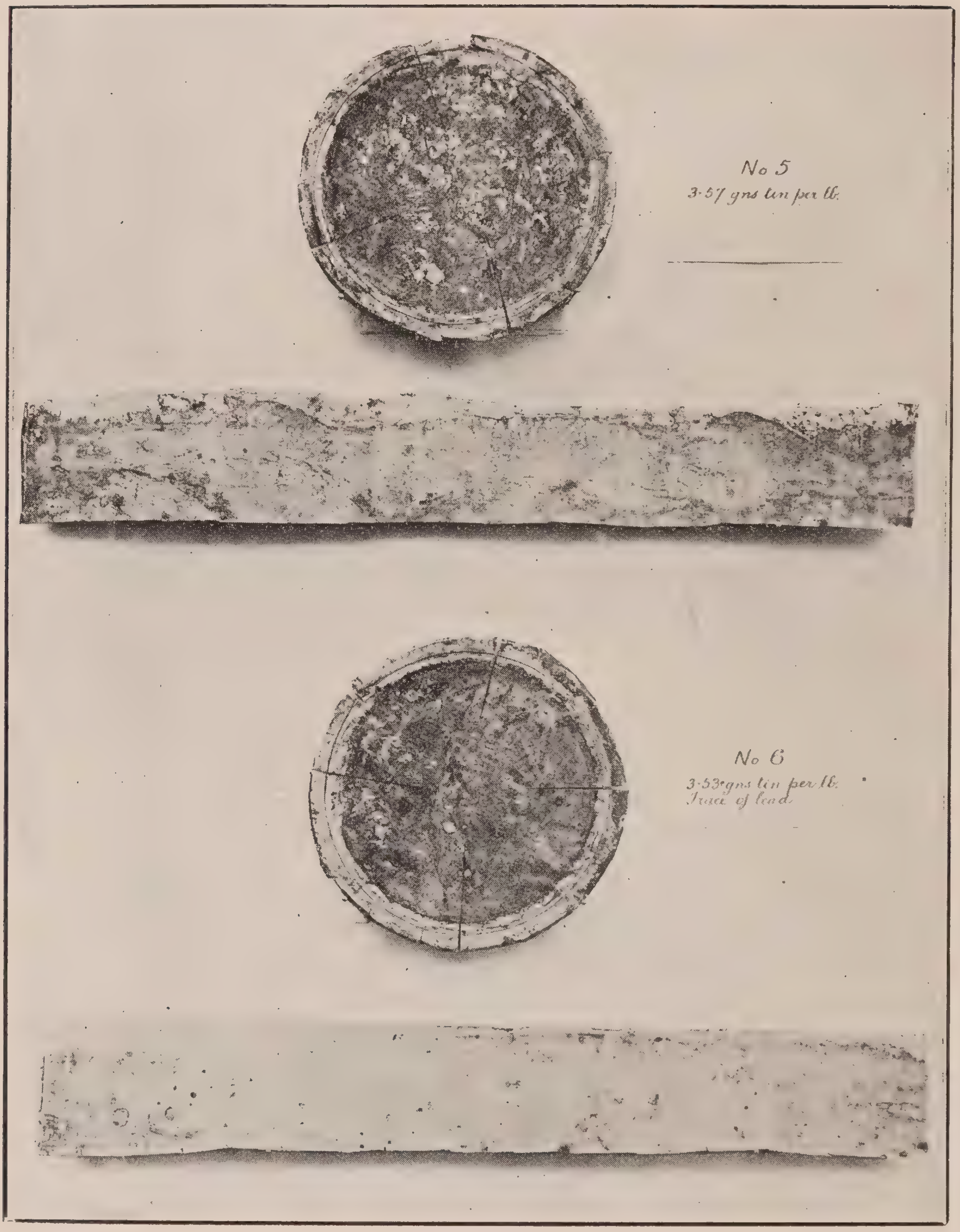
Brand C.


No 1
·54 gns. tin per lb
No 2
4·92 gns tin per lb
2·09 gns lead per lb
(probably pellet of solder overlooked)

BRAND D.



BRAND D.



BRAND D.

Nos. 5 and 6, although on reference to the photograph it appears to be more affected than No. 5. It is possible that there was a thicker coating of tin in the case of No. 4, which would account for the greater quantity in the fish. My reason for grading it as No. 4, and not No. 5, was that the blackened portions, to the eye, showed much tarnish rather than actual corrosion.

The absence of lead would exclude the possibility of a small pellet of solder having been overlooked in the analysis.

In *Brand C* the error in grading is still greater, in that two cans, Nos. 3 and 5, both showed higher tin-content than No. 6. The absence of lead again excludes the accidental presence of a pellet of solder which could vitiate the result.

Brand D shows even more clearly the difficulty experienced in attempting to grade the amount of tin present by the extent of corrosion; for excluding No. 2, in which a pellet of solder appears to have been introduced into the analysis, it will be seen that No. 4 should have been No. 3, No. 3 should have been No. 6, and No. 6 should have been No. 4.

It would appear from the photographs that the long band of metal taken from the can in the case of Nos. 4 and 6 is almost free of corrosion. This is not in reality the case, but these strips were scrubbed with soap and water to remove some adherent fish-scales, with the result that the underlying iron became sufficiently polished to reflect light, and therefore in the photograph show white.

I have come to the conclusion, as a result of this experiment, therefore, that though one may be able to get a very good idea by visual evidence as to whether a given extent of corrosion imparts to the contents a greater quantity of tin than 2 gr. to the pound (for previous to analysis I had correctly determined which cans of the various series would exceed the standard of 2 gr.), it is almost impossible, unless the tins vary widely as regards corrosion, to grade them very accurately. The former point, however, is from a practical public health view the most important, if the standard of safety laid down in Buchanan and Schryver's report is to be adopted.

Brand E.—Unphotographed, but included in the analytical table, was a sample of soused herring markedly acid in reaction on account of the contained vinegar. The cans showed a marked degree of corrosion upon the inside, which corrosion was confined to those parts which had come in contact with the liquor. But the figures, in spite of the presence of acetic acid, do not exceed that found in the fresh herring to the same extent as one would expect. The tins only coming in contact with liquor over one-half of their internal surface, however, the corrosion was confined to one-half only. Had the tins been full of liquor it is probable that the figures might have been doubled.

If Dr. Schryver's contention, then, is accepted as reasonable, one was quite justified in considering the contents of these tins unfit for consumption.

If this paper has aroused some interest in the subject of tin-contamination of foods, or should give rise to some discussion or statement of opinion or experience of members, it has attained its object.

I submit that the photographs laid before the section are worthy of perusal, and shall be glad to give any information I possess in regard to them.

I have to acknowledge my indebtedness to my chief, Dr. Hope, by whose kind permission the investigation was undertaken ; to Mr. Stacey, Acting Government Analyst, for his courtesy in placing at my disposal an officer to carry out the analytical work ; to Mr. Mallock, of the Government Analyst's Department, who at all times, with anxious care and the closest attention to analytical technique and mathematical precision, undertook a very tedious series of analyses ; and to other officers of the Health Department for valued suggestions and assistance in collection and grading of the tins.

Brand of Fish.	Serial Number.	Weight of Fish in Can, in Ounces.	Grams SnO_2 recovered.	Grains of Tin per Can.	Grains of Tin per Pound.	Grains of Lead per Pound.	Average Grains Tin per 1 lb. Can.
A	No. 1	15·15	0·020	0·243	0·25	None	2·91
	No. 2	14·94	0·240	2·916	3·12	,,	
	No. 3	14·04	0·244	2·964	3·38	,,	
	No. 4	15·91	0·247	3·00	3·02	,,	
	No. 5	15·29	0·266	3·23	3·38	,,	
	No. 6	15·09	0·336	4·08	4·33	,,	
B	No. 1	15·99	0·078	0·952	0·95	,,	3·09
	No. 2	16·93	0·148	1·80	1·70	,,	
	No. 3	16·42	0·214	2·60	2·53	,,	
	No. 4	15·84	0·395	4·79	4·86	,,	
	No. 5	15·73	0·346	4·20	4·28	,,	
	No. 6	16·07	0·352	4·28	4·26	,,	
C*	No. 1	17·50	0·117	1·42	1·31	0·12	3·05
	No. 2	16·62	0·215	2·60	2·53	None	
	No. 3	15·05	0·320	3·89	4·14	,,	
	No. 4	..	..	..	..	,,	
	No. 5	15·58	0·307	3·73	3·83	,,	
	No. 6	17·44	0·312	3·79	3·45	,,	
D†	No. 1	15·47	0·043	0·52	0·54	,,	3·09
	No. 2	15·34	0·388	?	4·92	2·09	
	No. 3	15·30	0·383	4·68	4·88	None	
	No. 4	15·54	0·236	2·87	2·96	,,	
	No. 5	15·19	0·279	3·39	3·57	,,	
	No. 6	15·06	0·273	3·32	3·53	Trace	
E	No. 1	13·27	0·120	1·46	1·77	None	3·96
	No. 2	11·83	0·235	2·85	3·86	0·058	
	No. 3	12·36	0·204	2·47	3·21	Trace	
	No. 4	12·76	0·271	3·30	4·14	,,	
	No. 5	11·57	0.303	3·66	5·09	Good trace	
	No. 6	13·06	0·385	4·68	5·74	None	

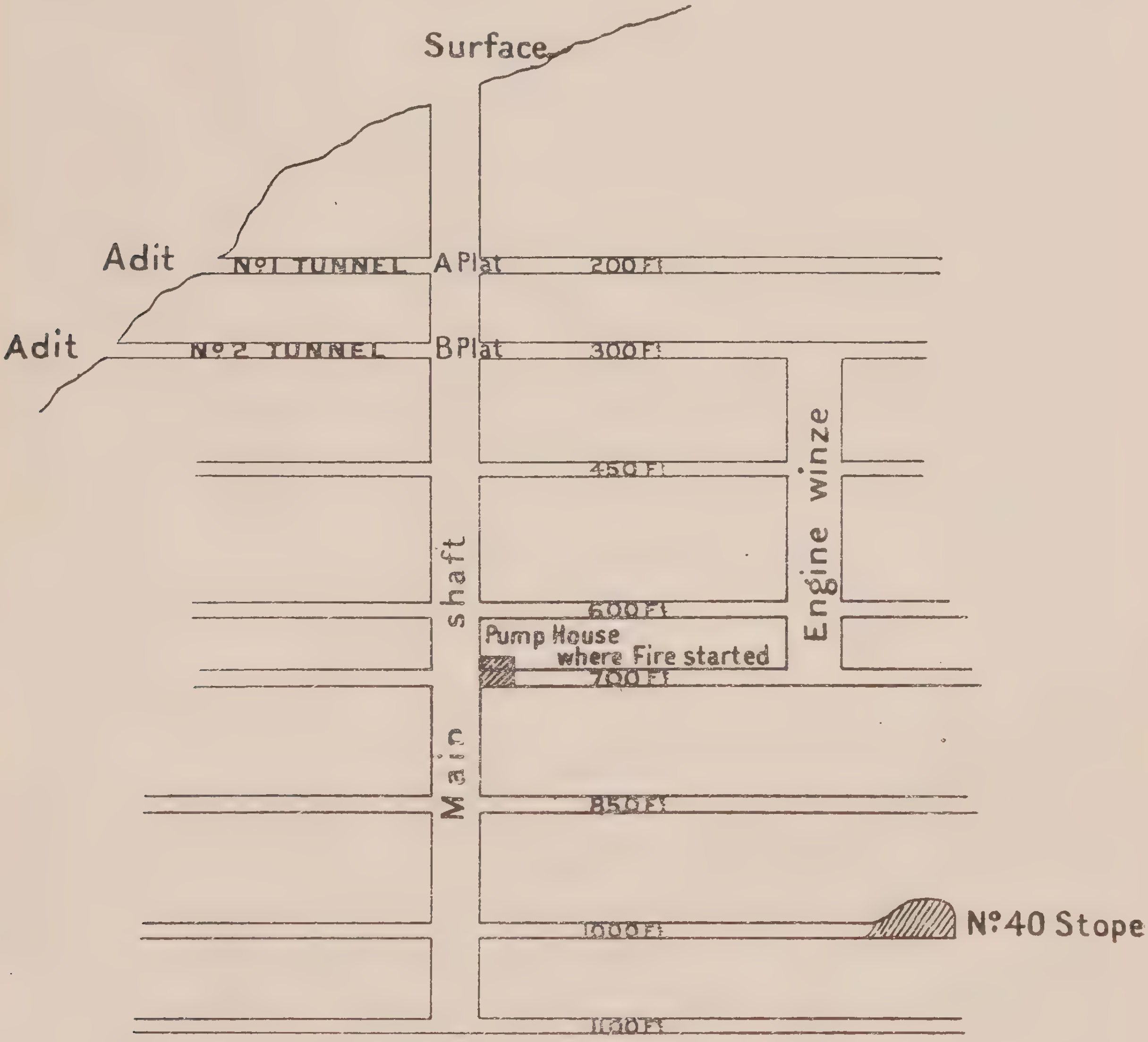
* Lost during analysis. † Probably small pellet of lead present. This number not included in average.

A MINE FIRE WITH HEAVY LOSS OF LIFE.

(BEING SOME NOTES ON A FIRE THAT OCCURRED IN THE NORTH MOUNT LYELL MINE, TASMANIA, ON 12TH OCTOBER, 1912.)

By JOSEPH LOVE, M.B., B.S. (Melb.), Gormanston, Mount Lyell, Tasmania.

AT about 11.30 on the morning of 12th October, 1912, I got a telephone message that the pump-house on the 700 ft. level of the North Mount Lyell Mine was on fire. On reaching the mine I was directed to No. 1 tunnel, and found that the men were being pulled from below in cage-loads, and were being discharged at the plat marked A, where No. 1 tunnel intersects the main shaft. The distance from the shaft to the tunnel-mouth is several hundred feet.



The North Mount Lyell is a copper-mine situated in very wet country. The rock which is being mined contains a large percentage of occluded water. The whole workings are wet, not a dry spot to be found anywhere except some small compartments that are specially made watertight, and all the woodwork is saturated and dripping with water.

Large volumes of vapour, at this stage mostly steam, and fairly easily respirable, were coming up the shaft and out some 200 ft. along the tunnel. This vapour smelt strongly of burning tar or pitch, mixed with the sour smell of burning wet wood. The men coming up were being pulled through this vapour in the shaft for distances varying from 300 ft. to 800 ft., and this journey would occupy from two to ten minutes, including stops. Many were suffering from partial asphyxia, with suffused eyes, red faces, purple lips, and laboured respiration due to the difficulty of breathing the acrid smoke and steam-laden fumes in the shaft, but at this time none showed any signs of carbon-monoxide poisoning.

I received them at the plat A, and after giving them hurried attention sent them out to the tunnel-mouth, where my colleagues—Drs. Hamilton and Massey—gave them what further attention was necessary.

Soon the vapour coming up the shaft began to get hotter and more smoky, and at every ascent of the cage large volumes of acrid hot smoke were belched out along the tunnel. This smoke was now quite irrespirable; it immediately induced spasm of the glottis from its acrid nature, and was so dense that we could not see our candles held a foot in front of our faces. With the movements of the cage in the shaft the smoke was drawn into the shaft and out of the tunnel, but was belched forth again with the next trip of the cage.

The pipes conveying compressed air to the rock-drills used in the mine were of the greatest service here, as they gave us a good stream of pure air at a high pressure. By taking advantage of these and the momentary recessions of the smoke, it was possible to get to the plat and pull out any men who were in the cage.

These men now showed the following signs: Eyes bloodshot, faces suffused, lips blue and swollen, gait tottering and staggering, and hardly able to walk, while at the same time they were violent and intractable, as though partly intoxicated with alcohol. They were in a state closely resembling that of a quarrelsome "drunk," and had to be dragged out of the tunnel by force, in marked contrast to the first men who came up, who were quite self-possessed and collected. At first, as they came to the plat, I gave each a strong nip of brandy and water, but seeing the close resemblance of their condition to alcoholic intoxication, and noticing that the brandy increased this, I soon stopped giving it, and substituted a mouthful of cold water before sending them on to the tunnel-mouth.

Now the cage began to come up empty, and after waiting while twenty or thirty trips were made by the cage, on which no one came up, we concluded that all who could get up that way were up. We went outside to the open air, where it was found that all the men who had come up were so far recovered as to need no more attention, with the exception of one man who was having a typical epileptic seizure. Inquiry later on proved that some years before he had had a similar seizure, and no doubt the strong excitement of this morning had been quite sufficient to induce another.

We now learned that there were still ninety-four men below; and attention was directed towards endeavours to rescue them by way of the plat B, where No. 2 tunnel cuts the shaft 100 ft. below where we had been working, and by way of the engine winze C, some 300 ft. farther in on the same level.

By this time the shaft, tunnels, and workings generally were full of acrid irrespirable fumes; but the management, by means of brattices or curtains made of tarpaulins, blankets, boards, anything that was handy, and with the help of the air-hoses above referred to, and other technical devices that do not concern us here, controlled and diverted the air-currents so that operations could proceed.

From this on, as far as medical help was concerned, we were only able to remain handy in case we were required. As a fact, our services were rarely called for. We converted the change-house, where the men don their working-clothes before going below, into a temporary hospital, and the management organized a canteen at the tunnel-mouth. Cylinders of oxygen were obtained, and were kept at the winze C, where most of the work was being done, at the plat B, and at the temporary hospital. Two of Draeger's "Pulmotor" machines were procured. One was kept at the winze C and one in the temporary hospital. These were not used, as the opportunity for using them did not arise; but had we required them they would have been of great service, so I shall briefly describe their use and mode of action.

The "Pulmotor" is a mechanical device for performing artificial respiration, and at the same time administering oxygen to the patient. It consists of (1) a cylinder of compressed oxygen; (2) a double-acting pump that will either force or exhaust; (3) a face-piece similar to the face-piece of a Clover's ether-inhaler, all connected by tubes and fitted with the necessary valves and stop-cocks.

In use all that need be done is to place the patient on his back, press the face-piece against his face, and turn on the oxygen. The oxygen goes to the pump, and by its pressure supplies the motive power for the pump. The pump pumps oxygen into the face-piece, and so into the lungs. When the O_2 pressure in the lungs reaches a certain height (8 in. water column) a valve automatically reverses the pump and exhausts the oxygen from the lungs until a certain negative pressure ($4\frac{1}{2}$ in. water column) is reached. The valve then again automatically reverses the action of the pump, and so on indefinitely. In order to be sure of a clear airway to the lungs a simple device enables the operator to hold the patient's tongue forward with the hand that steadies the face-piece.

As I have said, it was not found necessary to use this apparatus, but I think it will be at once apparent that if we had had a large number of men coming up asphyxiated or poisoned by CO, and requiring artificial respiration, this device, which never grows tired, would have been a great boon. Any man who has been concerned, say, in a drowning accident will know the insuperable fatigue that overpowers him after having performed artificial respiration for an hour or two. Another advantage, particularly in case of CO poisoning, where the haemoglobin is largely fixed by the CO, and so loses its power of transmitting O_2 to the tissues, is that pure O_2 is supplied to the lungs, and so every possible molecule of O_2 finds its way into the blood.

On the third day two men imprisoned on the 400 ft. level were able to get to the surface none the worse for their experience. By this time it was apparent that in different parts of the mine three main sets of conditions obtained. These were: (1) Places where there were dense masses of acrid opaque smoke; (2) places where there were large quantities of carbon monoxide, with a clear atmosphere; (3) places where there were quantities of carbon dioxide, with a clear atmosphere. Mixtures of all these conditions, in all proportions, with wide variations in temperature, occurred according as the ventilation was controlled by those in charge. It was noticed that these different mixtures of gases behaved in a very characteristic way, if we consider their specific gravities.

Note.—Taking the specific gravity of hydrogen as unity—s.g. of air is roughly, 14·4 ; s.g. of CO is roughly 13·98 ; s.g. of CO_2 is roughly 21·96.

The dense masses of smoke drifted where the air-currents took them, or hung stationary with little tendency to diffuse, gradually settling as soot.

The CO, the difference between whose s.g. and that of air is so slight as to have very little effect, drifted where the currents took it, rising with an upcast and falling with a downcast, but when stationary diffusing into the surrounding air with extraordinary rapidity. The CO_2 settled out to the bottom, and, while of course following the direction of the air-currents, showed a marked tendency to flow along the floors and fill up low-lying places, without much tendency to diffuse.

We will now note briefly the special apparatus used in exploring the workings.

(1.) A couple of ordinary marine diving-dresses were procured. With these a large bellows pump on the surface was connected to the helmet of the dress by means of a long and strong rubber hose. This supplied the diver with air. These were found to be of very little use, on account of the enormous weight of the 200 ft. to 600 ft. of hose that the diver had to carry about with him. (In marine work the density of the water supports this weight.) Again, when the diver was several hundred feet down the shaft the strain on the upper end of this hose was enormous, this strain being due to the weight of the length of hose hanging in the shaft. Even when this was relieved by lashing a hemp line to the hose the strain on the latter was such that we were in great fear that the hose would part.

(2.) Helmets made to fit over the head and shoulders were procured. The first type used had a reservoir attached to the wearer's shoulders, into which air was compressed by means of a strong tire-pump before descending. This air was slowly admitted through a valve into the helmet. These were found to be good for short dashes only, as (*a*) they were cumbrous and awkward, (*b*) only enough air could be got into the reservoir to last for from ten to twenty minutes, (*c*) poisonous gases crept up between the man's skin and the edge of the helmet when he moved his shoulders (this last defect was very marked if clothing was worn, but was still apparent even on the bare skin).

(3.) Helmets with a short length of hose and a bellows pump were useful for short distances, and would do very well for a house-fire, but were no good in a mine, on account of their limited radius.

(4.) Helmets which had on one shoulder a cylinder of compressed oxygen and on the other shoulder a cylinder of caustic potash were much the best. They were light and handy, no outlet valve for used air being needed, and could give enough oxygen to enable a man to work below for two hours on one charge. He could carry spare charges with him of O_2 and KOH, and change them while down below.

The *modus operandi* is as follows : The man's head and shoulders are sealed into the helmet as well as possible. As his air becomes exhausted he admits O_2 into the helmet. The pressure of this forces his used air through the KOH, where its CO_2 is absorbed and its N_4 is passed back again for further use. Even with these there was a little trouble at times from irritating gases getting up between the edge of the helmet and the man's skin, but with bare skin this was not much. After a day or two's use the men were much better able to work with these helmets, emphasizing the fact that where fires may occur a set of *trained* men to use the necessary apparatus is absolutely essential.

About this time many of our men were more or less "gassed" with CO. The symptoms were characteristic, consisting of (1) muscular weakness, showing itself first in the quadriceps extensor cruris; (2) palpitation of the heart, with a feeling of constriction of the chest; (3) an inclination to resist authority and to disobey orders; (4) an overpowering desire to be let alone and to lie down and be comfortable (even men who fully realized the danger said that they did not care to make an effort to escape); (5) severe headache, frontal, temporal, and occipital; (6) blunting of the finer mental powers—for example, an engineer, whose life's work and interest has been centred in the mine, lost for some days his mental picture of the underground workings, so that he was with difficulty able to locate any given spot in the mine.

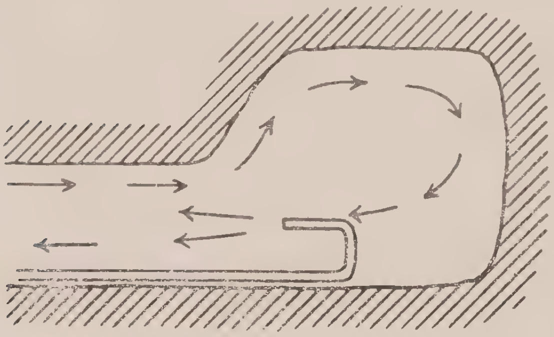
The best restorative was found to be a few breaths of pure O_2. Any persistent headache was relieved easily by aspirin or phenacetin, the former having apparently the better effect. The muscular weakness persisted for three or four weeks, only gradually wearing off.

Another interesting point that was noticed was that a man who had been "gassed" once became extraordinarily sensitive to the presence of slight traces of CO in the air. This is easily explained if we consider the action of CO on the blood. The blood normally contains haemoglobin. This haemoglobin has an affinity for oxygen, and, on being exposed in the lungs to an atmosphere containing oxygen, takes up oxygen to form an unstable compound HbO_2. On reaching the tissues, which have a greater affinity for O_2 than has Hb, the O_2 is seized by the tissues, and the Hb goes back to the lungs for more. Now, Hb has a much stronger affinity for CO than it has for O_2, and, when exposed to an atmosphere containing CO, forms with it a *stable* compound, HbCO. This HbCO cannot be dissociated by the tissues, so that the Hb so fixed becomes useless and lost as a carrier of O_2 to the tissues. Now, assuming that a man has normally 100 per cent. of Hb, all of which is available for carrying O_2 to the tissues, and that 70 per cent. of this Hb is sufficient for him to work on quietly. Now, suppose that 30 per cent. of this Hb is fixed as HbCO, then he can still carry on quietly; but on the slightest exertion, when his need for O_2 is increased, he is unable to carry on. He is just on the border-line—he has no reserve of Hb. Now, if such a man be exposed to an atmosphere containing even a minute trace of CO, a little more of his Hb is fixed and he is at once unable to carry on. This sensitiveness to the presence of CO was noted in many cases, and persisted for from fourteen to twenty-one days—in one case, for thirty-six days.

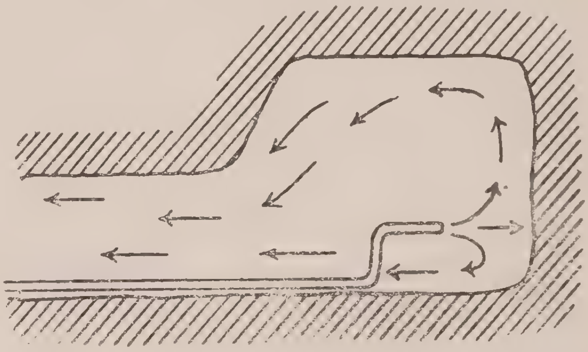
Mr. Hartwell Conder brought some cages of chickens, which were used as indicators for the presence of CO. They were very sensitive, and proved to be most excellent indicators and most reliable guides for working.

At no time was the percentage of CO found to be so high that an explosive mixture was formed, so that the naked mine-candles were used as indicators for the presence of CO_2. They answered admirably, and for working in CO_2 powerful electric hand-lamps gave a satisfactory light.

On the fourth day fifty men imprisoned at the 1,000 ft. level in a dead-end were able to get to the shaft and use a knocker-line that was hanging therein to signal to us at the plat B. With much joy we lowered down to them candles, blankets, beef-tea, food, &c., at intervals, and on the sixth day they were brought safely to the surface via the engine winze C. None of them suffered any ill effects worth mentioning, with the exception of the mental strain from their long imprisonment. The mental strain varied with the temperament of the men.



They reported that they had taken refuge in a *cul-de-sac* which had a narrow mouth, and in which a stream of good potable water was flowing. They had with them the air-hoses that they used for working their rock-drills, and these gave them a supply of fresh air. At first they directed the hoses towards the mouth of the *cul-de-sac*, but found that by so doing they caused the smoke to circulate through their chamber, as shown in the sketch. So they then directed the air-blast against the back wall of the chamber, and found that that effectually drove the smoke and fumes out of the chamber.



As showing the deadly character of the fumes, three of their number who attempted to bolt for the shaft in the earlier stages fell dead before they had got 20 ft. from the mouth of the chamber.

Thorough exploration now showed that all the other forty-two men in the mine were dead. It was not yet possible to raise any of the bodies to the surface, but inspection *in situ* indicated clearly the manner of their death. A very few were lying in contorted strained attitudes, with purple bulging faces and staring eyes, indicating that they had been asphyxiated by the acrid irritating smoke or by the CO_2 (even these few showed later by spectroscopic examination of their blood that HbCO was present in large amount, and was presumably the immediate cause of death). By far the larger number were lying peacefully with their heads pillowed on their arms and their bodies composed as if for sleep. In many cases they were lying or sitting or even standing over their air-hoses, with the fresh air playing on their faces, but quite dead. The eyes were bright, the cheeks rosy and fresh looking, and the lips as cherry-red as those of a healthy child. This, of course, was proof of CO poisoning, as a miner, as a rule, has a sallow complexion and far from cherry lips, but the corpses were so life-like that in many instances it was difficult to believe that they were dead, and had been so for a week or more.

A body was now got to the cage in the shaft, but had to be abandoned here owing to an increase in the fire. Much water was coming down the shaft, and this had the following effect: The body when placed in the cage on the 19th October, after being dead probably seven days, was fresh and well preserved. When it was brought to the surface on the 4th November, after being in the shaft for sixteen days, it was reduced to a brownish mush, in which organs were with difficulty recognized, and from which it was impossible to get any fluid even remotely resembling blood for spectroscopic examination.

On the 4th November another body that had been lying in a dry warm part of the mine, where the temperature for several days had been slightly over 100° F., presented the following appearance: The face and hands were almost jet black, but the skin where it was covered and particularly where flexed on itself, as at the bend of the elbow, was fresh and white. The whole body was dried as if in a drying-oven, no fluids being present anywhere—bladder empty, heart empty, great blood-vessels empty, but painted on the inside with a reddish-brown paint of dried blood. The organs were in an excellent state of preservation, the lungs being of the consistency of fairly dry putty. A portion of lung and some of the dried blood were taken and extracted with water, and this extract examined spectroscopically.

In order that as much as possible might be discovered about this body no disinfectants were used for some time for fear of introducing disturbing chemical factors, but within fifteen minutes of the time when it was brought to the surface it was most amazingly putrid. Phenyle was now used, but was not a brilliant success either as a deodorant or as a disinfectant. Formalin was found to be too irritating to the eyes for general easy use. Dr. J. S. Purdy, Chief Health Officer of Tasmania, forwarded a large quantity of "kerol," which in all subsequent post-mortems was used with extremely satisfactory results.

On the 7th November a detailed inspection was made of as much of the mine as was practicable. In a drive a third body was found, but as it had been moved since death during the earlier stages of the work nothing of interest was to be learned from its posture. The face was black and the features unrecognizable. Farther on in a cool "dead-end" were found bodies Nos. 4 and 5 that had not been disturbed. No. 4 was lying on his left side, with his head on his left arm, his right arm thrown forwards still holding a "spider" or miner's candlestick in which was a quarter of an inch of unburned candle-end. The knees were drawn up, and the whole pose suggested comfortable easy repose. The face was black, but not distorted. Some days earlier the face had been fresh and ruddy, as described above. The fact that a small candle-end was in the "spider" showed clearly that the man had laid himself down in comfort, that he had died, and that the candle had quietly burned itself out.

Corpse No. 5 was lying a few feet farther on, at the foot of a small bank of earth. The body was lying on its face with its arms and legs crossed, the arms being beneath the body. It was remarked that this was an unusual attitude, and investigation showed signs that the man had lain down on his back or side on the small bank of earth, had then died, rigor mortis had set in, and on the passing-away of rigor mortis the body had collapsed and rolled over down the slope. While this was being discussed a man came up who had been among the first to penetrate to this part of the mine. He was asked if he had noticed this body previously. He said that he had, and that the body was then lying on its back on the top of the bank, but that he had not liked to say so, as he was suffering from the effects of CO poisoning at the time, and thought that we might think him the victim of an hallucination, and so discredit his reliability as a witness.

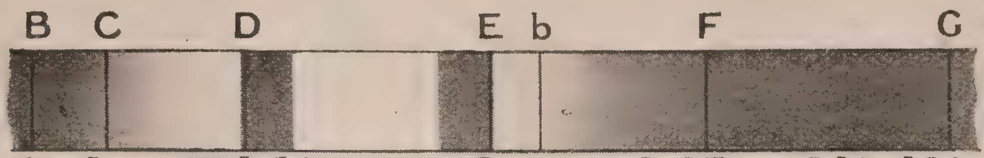
Corpses Nos. 6 and 7 were lying close by at the bottom of a hole 3 ft. or 4 ft. deep. A letter written by No. 6 had been found some days earlier pinned to a log of timber, as also was a small notebook in which No. 7 had written his will. Both documents were clearly written. No. 6 described how Nos. 4 and 5 had died, also the time, and said that he and No. 7 would soon be dead. He then took leave of his wife and child, with some details of a domestic nature, and signed his name. No. 7, who was an Italian, had written "*addio*" several times, then a short prayer in Italian, then his will in English, and finally had signed his name, the signature being almost illegible. Evidently these two men were protected for a time by being at the bottom of the small hole, so that the CO did not diffuse down to them until some time after it had killed their two mates.

The bodies were dealt with as follows: A roomy shell with an iron band longitudinally round it, and having a strong ring at the head end, was laid beside the body. The body was now wrapped in a square of sailcloth and lifted into the shell, the lid screwed down, and the shell taken to the shaft, where the ring was made fast to a hook in the roof of the cage, and so to the surface. When the shell was opened the body was soused with "kerol" solution, and the post-mortem examination then carried out in the usual way. By this time the faces were black, but the organs were in a good state of preservation, the blood and tissues showing well the characteristic bright-red appearance due to CO poisoning. These bodies, which had been lying in a cool moderately damp place, did not show the curious brown liquefying putrescence of No. 1 nor the drying and the mummification of No. 2. They soon, however, got very putrid, and after portions of blood and organs had been removed for more leisurely examination were soldered into coffins of heavy galvanized iron.

We now come to a brief description of the tests used to verify the presence of CO in the blood and tissues. A small pocket spectroscope was used, of the pattern used by the students in the Melbourne University physiological laboratory. This gives a visible solar spectrum of apparently 2½ in. length and ⅓ in. breadth, and shows distinctly the more important of the Fraunhöfer lines. A solution of Am_2S was prepared by passing a stream of H_2S through a solution of AmOH.

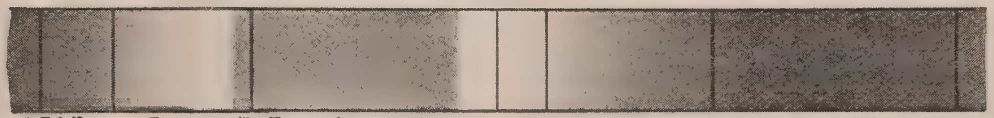
As a control, healthy blood from a normal individual was used. By trying various dilutions it was found that a dilution of about 1 in 100 of water gave the most distinctly characteristic spectrum. A dilution of this strength when held in front of the spectroscope showed the appearance seen in fig. 1—two distinct absorption bands between the Fraunhöfer lines D and E, the one nearer the D being a little denser and narrower than the one nearer the E. By adding a small quantity of Am_2S to the solution the oxyhaemoglobin was reduced to reduced haemoglobin, the bright red of the solution changing to the purplish colour of venous blood, and the spectrum now showed the appearance seen in fig. 2, the two absorption bands having disappeared and their place being taken by a single band not so dense as the two in fig. 1, but extending a little to the left of the D, and covering the positions of both the former bands as well as the space between them.

1



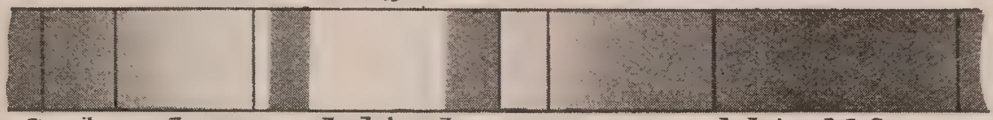
Oxyhaemoglobin, normal control, diluted 1 in 100.

2



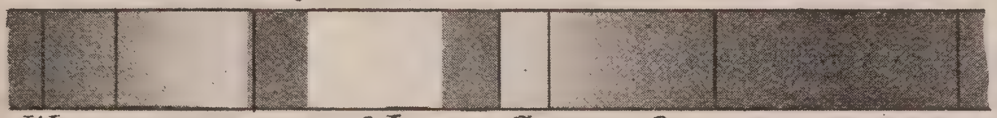
N^o. 1 reduced by Am_2S.

3



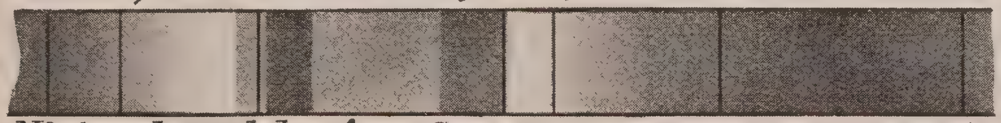
Carboxyhaemoglobin, known control, 1 in 100.

4



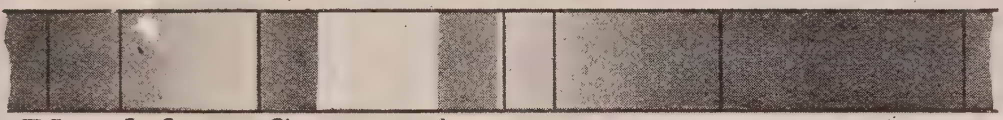
Watery extract of Lung, Corpse 2.

5



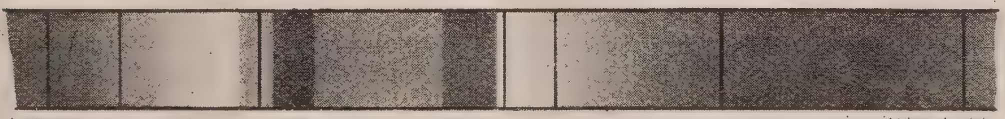
N^o. 4 reduced by Am_2S.

6



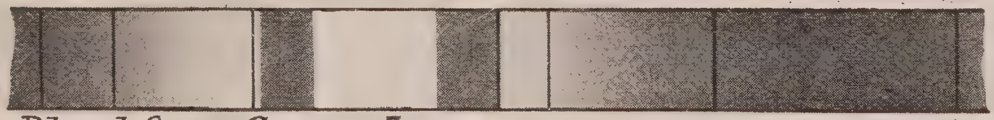
Blood from Corpse 4.

7



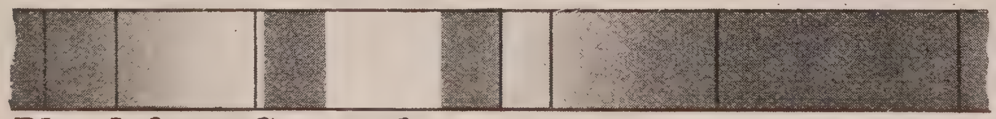
N^o. 6 reduced by Am_2S.

8



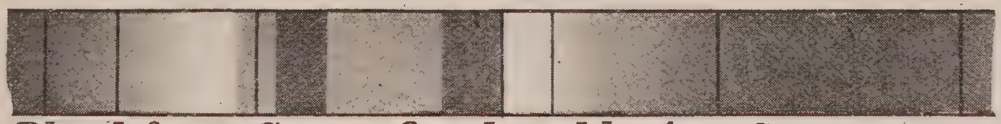
Blood from Corpse 5.

9



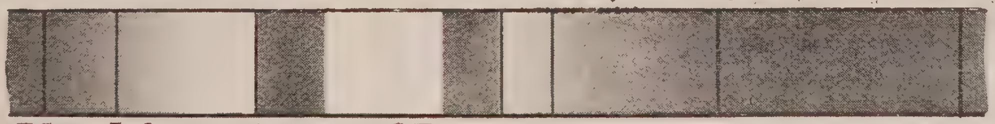
Blood from Corpse 6.

10



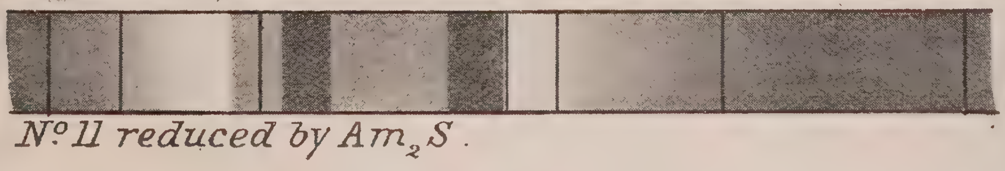
Blood from Corpse 6 reduced by Am_2S.

11



Blood from Corpse 37.

12



N^o. 11 reduced by Am_2S.

Now we know that a solution of blood of this strength, in which all the haemoglobin has been fixed by CO and made into carboxyhaemoglobin, gives the appearance shown in fig. 3—that is, two absorption bands very similar to fig 1, but differing in that the bands are more nearly of the same breadth and density, and that the left band is just a trifle farther from the D than is the band in fig. 1. We also know that carboxyhaemoglobin is not reduced by the addition of Am_2S, and so the spectrum remains unchanged on the addition of that reagent.

From corpse No. 1 it was not possible to get any specimen, for the reasons explained above.

From corpse No 2 was obtained some fairly moist lung and some brownish-red dry powder from the pulmonary veins, which I took to be dried blood. A watery extract of these gave a reddish-brown liquid with a peculiar cherry tinge in it that became more apparent as the solid particles settled to the bottom.

Let us consider for a moment what we would expect to find on examination of this. Firstly, we would expect to find some carboxyhaemoglobin. The man, however, would die before all his haemoglobin was fixed by CO, and after death there would be little tendency for more CO to diffuse into his blood, as it would no longer be drawn into his lungs by respiration, so we should also find some oxyhaemoglobin in the extract.

On examination the appearance shown in fig. 4 was found, two bands almost indistinguishable from either fig. 1 or fig. 3, but partaking of the nature of each.

A small quantity of Am_2S was now added to the solution, rather more than had been sufficient to completely reduce the control specimen of normal blood. The solution was very little changed in appearance, the cherry tinge still remaining, but the solution becoming a little but definitely more purplish in appearance. The spectrum was now found to present the appearance shown in fig. 5, which was almost as if fig. 2 had been superimposed on fig. 3, but fainter. The whole space, from a little to the left of the D almost up to the E, was occupied by a faint band which had two denser bands superimposed on it, one just to the right of D and one just to the left of E.

Addition of further excess of Am_2S made no difference in the appearance. This, then, definitely proved the presence of carboxyhaemoglobin in fairly large quantity, plus a percentage of unfixed haemoglobin.

On further dilution of the original extract of lung, the cherry tinge in the solution remained as a distinct pink colour long after the red of a dilution of normal blood had been transformed by dilution to a faint yellow. This cherry tinge and the spectroscopic appearance are still observable in the specimen on the 1st January, 1914, more than thirteen months later.

Excellent samples of blood were obtained from bodies Nos. 3, 4, 5, 6, and 7. They all showed distinctly the bright cherry-red colour of carboxyhaemoglobin. A dilution of 1 in 100 of blood from corpse No. 4 gave the spectrum shown in fig. 6, which is, as will be seen, almost identical with fig. 4, but more distinct, as would be expected, seeing that fig. 4 was from a watery extract of lung. On reduction with Am_2S in excess the cherry-red took on a slightly more purplish tinge, but was not much altered, and the spectrum now showed the appearance shown in fig. 7, which is almost identical with fig. 5, but again more distinct, as would be expected. Again extreme dilution of this blood showed that the red colour persisted as a distinct pink long after a similar dilution of the control normal blood had faded to yellow.

Figs. 8 and 9 are the spectra of specimens from corpses Nos. 5 and 6 before reduction with Am_2S, and fig. 10 is the specimen from No. 5 after reduction with Am_2S.

These prove that in all these cases a large amount of carboxyhaemoglobin was present in the blood as well as a percentage of unchanged haemoglobin; so the opinion given to the Coroner was that death had resulted from carbon-monoxide poisoning.

The whole of the forty-two bodies were examined in the same way, and all with the same result. Some of them were not recovered from remote parts of the mine for many months, but where no blood was available extracts of the organs were used, and were quite satisfactory for examination purposes. Some that had been immersed for months in water containing ferrous sulphate and copper sulphate in solution were so tanned that the usual chin-to-pubes incision had to be supplemented by a transverse incision below the rib margin before the thick hard abdominal skin could be bent back to allow of the organs being examined.

The points noted were: (1) The extreme delicacy and certainty of the spectroscopic appearance even with a small instrument; and (2) the great permanency of carboxyhaemoglobin, the specimens (which have not been preserved in any special way) still showing the characteristic spectra fairly well after more than a year in the laboratory.

It is to be regretted that owing to the remoteness of the locality and the consequent difficulty of getting apparatus it was not possible to accurately determine the density or concentration of the different constituents of the blood in the specimens examined. Had such a determination been made it might have thrown some light on the fatal dose of carbon monoxide in man under actual working-conditions.

THE SANITATION OF MINES.

By J. S. Purdy, M.D., C.M. (Aberd.), D.P.H. (Camb.), F.R.S. (Edin.),

Metropolitan Medical Officer of Health, Sydney.

The occurrence from time to time of mining disasters, with serious loss of life, emphasizes the hazardous nature of a miner's occupation. Sudden death by fire, flooding, a fall of the roof, suffocation, or poisoning by gases are some of the many risks which a miner has to take whilst following his occupation underground. Apart, however, from accidents, there are certain conditions associated with mining which, unless precautions are taken, may prove inimical to the health and possibly hasten the death of the miner. In recent years much attention has been directed to the occurrence of lung-diseases among miners, due to the inhalation of dust. Exhaustive investigations have been made as to the cause, incidence, and prevention of pneumoconiosis, the most comprehensive report being that issued by the Mining Regulations Commission of the Transvaal, 1910.

The object of this paper is more especially to direct attention to the need for a higher standard of general sanitation for mines, quite apart from questions of ventilation and the prevention of miner's phthisis.

It is only in recent years that any attempt has been made to obtain sanitary conditions for the workmen underground. There is reason to believe that typhoid fever, more especially, has been contracted by miners owing to the filthy practice which obtained of men relieving themselves in byways and passes of the mines.

With regard to the occurrence of typhoid fever among miners in Australasia, in the past there has been a high incidence of this disease, more especially in newly developed mining fields. The conditions which arise on such fields are similar to what obtains in construction-camps, or wherever large numbers of workers are gathered together in places where there has been no preparation made to deal with the protection of the health of the population.

The haphazard growth of a settlement under which each resident is a law unto himself, the questions of the permanency of the field or of rating, besides the absence of direct supervision, are factors causing the usual insanitary conditions, not to mention the carelessness of some of the miners themselves in the disposal of excrement and selection of water-supplies.

During the summer of 1910 my attention was especially directed to the need for better control of such new mining fields by an outbreak of typhoid fever at Mount Balfour, Tasmania. The mining field, which was difficult of access, situated on the west coast, three days' journey from Stanley, the headquarters of the local authority at Circular Head, illustrated the early experience of most mining settlements. The water-supply was from shallow wells. There was no drainage, no sanitary service, and, generally speaking, no concerted action whatever had been taken with regard to sanitation. Many of the inhabitants simply used the shelter of the scrub, no nightsoil receptacles having been provided.

The local authority at Circular Head had delegated its authority to an extraordinary local committee, without delegating any funds, or exercising any powers of rating. Dr. Ingram, who had recently come to the field, recommended the closing of certain water-supplies, cesspits, &c., the inauguration of a double-pan service, besides the necessity for constructing proper pan-closets, and boiling all drinking-water.

At the time of the visit of our Inspector, Mr. Wadsworth, in April, ten cases of typhoid fever had been notified. Ten additional cases of illness previous to the arrival of Dr. Ingram were also suggestive of typhoid. The source of infection appeared to centre chiefly round the hotel and boardinghouse, several of the cases notified having dined at these places. Two disused cesspits were near the hotel well, and this water was alleged to have been used for making aerated water. The sanitary arrangements at the mines were also of the crudest; at one mine there were two cesspits, one of which was submerged in wet weather.

By direct assistance from the Government a temporary hospital was established, a double-pan service was introduced, cesspits were filled in, and the shallow wells closed. The co-operation of the Department of Mines, Tasmania, was obtained in having a complete sanitary survey made of all mines and mining fields, the Inspectors of Mines during their visits to each mine filling in a form giving in detail the conditions as to water-supply, number of privies above and below ground, &c. Last year, on visiting some of the mining fields, I found that this inspection and the following-up of notices had ensured the provision at least of adequate and satisfactory privy accommodation.

In New South Wales the following was published in October, 1904, as a new rule, and is embodied in the Mines Inspection Act, 1901: "In all mines where the circumstances do not permit of the men coming to the surface for the purpose of defecating, pans with disinfectant shall be provided for the purpose, and arrangements made for the bringing to the surface and emptying of the same at such regular intervals as may be determined by an Inspector of Mines. No person shall defecate in any mine otherwise than in the pans provided for the purpose. Human or animal excrement may not be deposited in any of the workings without the consent having previously been obtained from the Minister, who may modify or withdraw any such consent given under this rule. Where horses or other animals are used underground, the levels and workings must be kept free of their droppings to the satisfaction of an Inspector."

The Queensland Royal Commission on Mines in 1910 recommended that excremental pollution of any part of the mine-workings and wanton fouling of any privy below or above ground be made a punishable offence. It has been generally held that in the case of coal-mines, where the bed is approximately horizontal, there is little objection to the use of the "goaves" or "wastes."

Professor Kenwood, discussing this subject, states, "In the case of a flat coal-seam the waste may afford a suitable place for the disposal of excreta, these being quickly buried under debris as the working-face advances. Under the conditions of contract-working the men cannot be expected to lose much time in order to avail themselves of sanitary provisions; therefore, in addition to suitable provision being made wherever the workers congregate in the mine-workings and at the pit's mouth and bottom, it is generally necessary that sanitary conveniences are available within, at most, five minutes of the working-faces." He proposes that where only two or three men are working in positions difficult of access (as where the dips are steep) a small shallow galvanized-iron pail, with a locking cover provided with a central handle for carrying, and with narrow adjustable side-boards for sitting on, should be carried to the working-face, and returned to one of the recesses where the ordinary conveniences are provided as the men leave at the end of their eight hours' work. A scavenger with a scavenging-truck should collect the portable pails daily, their contents being taken to the surface and suitably disposed of, and the pails subsequently sterilized by steam.

With regard to ventilation, there have been in recent times great advances which have quite revolutionized the conditions under which the miners work. In the recent English Mining Act the standard laid down is that there must not be less than 19 per cent. of oxygen or more than ¼ per cent. of carbon dioxide. For very deep mines mechanical ventilation by force-draught fans is generally now adopted. Leonard Hill has recently shown that too much importance has been paid to the chemical purity of the air, and not enough to the temperature. He has demonstrated by actual experiments on half a dozen students enclosed in an airtight chamber containing about 3 cm. of air that after about half an hour the CO_2 has risen to 3 to 4 per cent., and the temperature has reached about 85° F., wet bulb. The men are then very greatly relieved by putting on electric fans in the roof, which whirl the stationary air in the chamber and cool their bodies.

He found that, whilst raising the percentage of CO_2 suddenly from 1 to 2 per cent. has no appreciable effect in increasing the discomfort, putting the fans on or off makes a great difference. Putting on the fans whirls the air round and brings the cooler air (at 85° F.) in contact with the body, and so promotes loss of heat by evaporation of the sweat and convection. It is thus recognized that perflation and circulation of air is even more important than ventilation. Thus mechanical ventilation by powerful fans is coming more and more into vogue in connection with improving the atmospheric conditions of mines.

With regard to the water for drinking, miners generally take a supply of tea or water down the mine, realizing that it is dangerous to drink mine-water even if in places such is palatable. An important matter is the protection of food taken down the mine by the miner. This should be kept in tin cans, boxes, or wrapped in paper. It has been suggested that the food should be only handled through paper, thus keeping the hands out of contact with the mouth.

Every established mine should have dressing-rooms or change-houses, and spray baths near the pit-mouth, and where the men do not avail themselves of these conveniences it should be impressed upon them to change clothes and wash before eating a meal.

In discussing the subject of sanitation in mines with Inspectors, mine-managers, and miners, one finds that there is general agreement that the great drawback to any attempt at sanitary reform is in the attitude of the miners themselves. Familiar with risks more obvious than neglect of sanitary precautions, the miner pays scant attention to warnings as to the need for exercising care with regard to personal hygiene.

This attitude was well illustrated in the case of the opposition in Great Britain to legislation establishing change-houses with baths, so that miners could, on coming from below, strip off their working-clothes, bathe and change before going home, as is the practice in most German mines. The old custom, of the miner having a tub in the living-room or kitchen of his cottage, is one which will die hard. In some respects miners are very conservative, and bound by tradition. For instance, I have come across miners who never washed their backs; they had an ingrained belief that washing weakened the spine.

Although the sanitary education of the miner is handicapped by the environment in which he lives and works, yet there are signs of improvement, and it is reasonable to expect that as a new generation of miners is evolved who have been taught the rudiments of sanitary education in schools we will find conditions much improved.

THE GROWTH OF THE AUSTRALIAN CHILD.

By Dr. Harvey Sutton.

No more important test of a child's health exists than that of satisfactory growth. This statement is an axiom among those who study children, whether in health or disease. Growth is a fundamental difference between the child and the adult; for the child, in contrast with the adult, is not merely a living, but primarily a growing, organism. Hence the fallacy in the tendency to regard children as, so to speak, miniature adults; and the essential truth of the remark that "The child is father of the man."

While in the adult loss of weight is a valuable indication of possible ill health, in the child "loss of weight" in the absolute sense does not exist. Practically all children (except temporarily during acute illness) are growing continually, so that loss of weight during any period is purely relative to the normal standard. The child has, for example, instead of putting on 12 lb. in the year, increased by only 4 lb., a relative loss of weight (due to a reduced rate of growth) of 8 lb.

This relative loss of weight is only one evidence of interference with growth. The bony frame and all that it connotes—height; chest, girth (circumference), breadth and thickness (diameters); and size of skull (head length, breadth, and height)—become fixed in the adult at the age of twenty-five years at the latest, when the bones finally ossify and growth ceases. All of these measurements are tests of growth of more or less importance, and a knowledge of the rate of growth of a child is recognized as vital to a proper estimate of its physical condition.

The rate of growth to be expected of a normal child can be known only when definite standards have been worked out which allow for all the factors normal to healthy children.

The physical development of a healthy child is influenced by a great many conditions, foremost among which are age and sex. Again, different races in the world vary in this respect, the average height, for example, of men ranging from 69·33 in. among Polynesians to 52·78 in. in the Bushmen of South Africa, while the average of all classes in Scotland, Ireland, England, and Wales is respectively 68·71, 67·9, 67·66, and 66·66. Nationality, then, is of considerable importance, especially in Australia. Here we have a relatively homogeneous white race of European (chiefly British) descent. Further, as already shown, 60 per cent. (approximately) of the school-children spring from Australian-born parents, while a new generation of about 2½ per cent. of Australians of the third generation, whose grandparents are all Australian-born, is now appearing. Whether there is or is not a definite Australian race of homogeneous character, which is being welded together from heterogeneous immigrant stocks, is a question for the future to determine; and it must primarily be decided on physical characters, and particularly by tests of growth.

Other factors of varying importance also influence growth. In England, among the professional classes, the average stature is 69·14 in., or 1·48 in. above the average of all classes of the community. Here two influences come into play: heredity (for tall parents tend to have tall children) and environment—here, probably, the more important factor, for the professional classes in England come from families where overcrowding does not, as a rule, exist, and the general surroundings are fairly satisfactory. The factor of parental stature has not been directly allowed for in our standards, but a certain margin is allowed both above and below the average, within which limits the child may still be regarded as normal. The environmental factors we have studied to a certain extent by comparing populations in the metropolis and in country-town centres.

Before we proceed to estimate physically any individual child, the average standards of growth differentiated for age and sex should be known. The child can then be measured and the results compared with the standards for its age and sex, allowing a certain margin for variations in heredity and environment. For example, in classifying nutrition we employ the height and weight tests, and separate children into five divisions—well above the standard, above the standard, normal or average, below the standard, and markedly below the standard. In practice, we employ figures 5, 4, 3, 2, 1 respectively.

Of course, the best method is to compare the present measurements with those taken at an examination some time previously, and so compare the rate of growth of the individual child in the year or two-year period with the normal rate of growth. This is now regularly done on our revisit to schools under the scheme of biennial examinations. Very often, however, children are seen for the first time. Even on a revisit to a school quite one-third of the children (partly entrants and partly transfers) have not been previously examined. Here the standards are again of value, and any marked departure from them must be regarded as very suggestive of some interference with health.

Having at hand standards for normal children, we at once have a valuable test at our disposal of the influence of any factor on the rate of growth and some idea of the degree of interference with health.

Beginning with infancy, the weight chart, with its regular increase of 4 oz. to 6 oz. a week, is the best test of progress, and a far better test of health than the clinical thermometer.

Various forms of alimentary troubles—chronic indigestion during the early years of life, and even infantile diarrhoea—greatly retard development. Rickets, which, as shown in our last annual report, is in mild degrees very common in school-children, shows itself in flabbiness of muscles and often puny development. In tuberculosis and in congenital syphilis the interference with growth is often of the grossest character, owing to the chronic poisoning of all tissues. In severe heart-defects, whether existing at birth or caused by disease (rheumatism, chorea, &c.), the failing heart-muscle shows itself in reduced growth, often to a most striking extent.

All these gross phenomena of disease are well known, but what is not generally realized is that certain so-called minor defects not ordinarily classed as diseases or ill health do have, owing to their long-continued action, very definite effects in retarding the growth and development of body and mind. These minor defects are chiefly defects of vision, of hearing, and of the nose and throat; and we have shown them to occur with distinct frequency in school-children. One in nine has defective vision; one in nine, defective hearing; and one in four, and even one in three, defects of nose and throat. The influence of the latter is the most pronounced, and shows itself in stature and weight below standard even to the extent of 2 in. to 3 in. and 5 lb. to 6 lb. respectively. It is also a potent factor in diminishing the rate of expansion of the chest and in helping to create various malformations, especially in the ricketty—pigeon-breast, for example. A proof of this statement is the remarkable way (noted in last year's report) in which children successfully operated on for post-nasals respond by a rapid increase of height and weight—not merely more rapid than that of similarly defective children who have not been operated on, but actually faster than that of ordinary healthy children of the same age and during the same period. The handicap of nasal obstruction and its attendant interference with respiration (particularly at night), disturbed sleep, frequent headaches, liability to all sorts of infections, colds in the head, sore throat, &c., has been removed. The organism, relieved of the incubus, responds in no uncertain fashion, and the child may to a large extent make up for lost time.

One important phase of the matter, and one, indeed, which lies at the base of all education, is a consideration of the fatigue-limit. In physical training and training for games it is a well-recognized axiomatic truth that any exercise continues to be developmental only as long as the fatigue-limit of the individual is not transgressed. The ancient story of Milo the Cretan, who was able to lift a bull through practising with it from the time it was a calf, shows the value of progressive exercise where the capability of muscle is never exhausted. An exercise continued to the state of utter exhaustion is a serious interference with training, and actually hinders development. Exactly the same principle is true of mental development. Mental exercise not transgressing the fatigue-limit will be developmental. There is this difference: that it is difficult in healthy children, who sleep well and have a sufficiency of play and rest, to overtax their brains. If their inherent mental capacity tends to be overstressed the child simply ceases work, and protects himself by ceasing attention and interest. The result is that normally the mind of the child takes in just such information as it chooses in just the amount it cares to receive. Stupid children, backward from poorer mental capacity, do not suffer from fatigue any more than brighter children who exercise their brains more vigorously.

But the aspect changes if, in the case of a child with fair mental capacity, you introduce the handicap of a physical defect. The child's brain strives to utilize its avenues of knowledge, its eyes and its ears; but these are partially obstructed, and so we tend to get a reduction of the fatigue-limit and signs of overstrain. Such, for example, is eye-strain. This shows itself in headache, an evidence not so much of ocular effort, but of brain-effort—the extra effort on the part of the nervous system to piece together defective information. The effect may be readily studied. From an optician one can obtain glasses which will slightly blur everything, just as the child's eyes do in astigmatism. The effort of wearing such glasses is extremely trying, and must be experienced before anything like a full realization can be obtained. Reading, whether near at hand or at a distance, becomes a bore, and one soon becomes headachy and mental effort extremely tiresome. Just the same occurs in children, with the further reaction on physical development of the headaches and occurrence of chronic fatigue. Most children with eye-strain fall behind in their growth, and are often quite "weedy."

In post-nasal growths the disturbance of sleep so characteristic of the affection, which shows itself in restlessness, snoring, sleep-talking, night terrors, teeth-grinding, and even sleep-walking, inevitably tends to reduce the limits of endurance of the brain, which is in itself satisfactory, but which has continually to fight with this chronic sleeplessness, and often morning headache.

An illustration may be taken from sports. Mere weightiness is little or no handicap either to a runner or to a horse, provided the weight is due to effective muscle ; but add to the runner or horse a weight to carry—" dead-weight "—and the result is, as everybody knows, a very marked handicap. So to the normal mind the " dead-weight " of these defects—vision, post-nasals, &c.—has a most profound effect, meaning in a large number a loss of eighteen months to two years—that is to say, the child, instead of reaching the seventh and eighth grades, often does not reach even the sixth grade.

Owing to this interference with educational progress, and again as a result of chronic fatigue, headache, illnesses, &c., the physical development is also retarded and the rate of growth is reduced. The stature, weight, and chest-expansion provide the evidence of these defects, which are wrongly thought to be of minor importance.

The importance cannot be exaggerated of adequate tests of the rate of growth by properly calculated standards. After experience of the examination of thirty thousand elementary-school children, undertaken with the avowed object of testing whether they could benefit fully from their education in school, we consider that the predominant factor in mental retardation in our schools is a physical factor—minor defects, and these very defects also greatly affect nutrition and growth. Such is the conclusion with regard to children up to puberty (fourteen years), nearly all of whom are in elementary schools.

In high schools other factors come into play, and stress of overwork and undersleep will here show itself not only in want of progress, but also in loss of weight and even actual breakdown. At all high schools weighing-machines should be introduced, and all children should be weighed at regular intervals every month, or at least at the beginning and end of the term. A reduced rate of increase of weight should at once arouse attention, and cause inquiries to be set on foot as to the work and life of the pupil.

In the near future it is hoped to put into practical application the recommendations of the Anthropometric Committee of the Science Congress, which includes the regular periodic measurement (height, weight, &c.) of all school-children. The progressive records of these tests of nutrition and health provide most valuable indications to the teacher of possible ill health in the children ; so that, besides the purely scientific and statistical value of these records, they would be most helpful to teachers in their work and to the general welfare of their scholars.

The taking of height and weight would best be done in the swimming-classes, where the variations in the clothes, boots, &c., of different individuals are no longer a disturbing factor. Chest-measurement (girth) could also be added, and such classes could be utilized for testing other phases of physical development—namely, the size and movement of the chest, correct posture, and proper action of the muscles in the ordinary physical exercises prescribed.

During the medical examination of children by the school medical officers for the past four years, the procedure as to measurement has been as follows : Prior to the examination, and usually about a week before, a portable spring-balance weighing-machine, specially designed by us and manufactured by Salter Bros., is forwarded to the school, and under the supervision of the head teacher every child is weighed and its height is measured, the results being recorded on the child's card and in the corresponding column as to date.

At first we used to test height by use of a wooden standard with sliding index. The expense of these has been avoided by the following simple and effective means: To a perpendicular piece of wood—a door-panel, for example—is attached with drawing-pins a penny tape cloth-measure, the zero being carefully placed on the level of the floor. While the child stands erect in his stockinged feet and with his back against the tape he is told to "keep his heels together and on the floor," and a set-square is placed so that the right angle has one side against the jamb while the other at right angles to the former side is gently run down on to the head against the scalp, care being taken to avoid the blocking caused by masses of hair. A correct estimate of the height is then read off in inches and eighths of an inch.

Weight is usually recorded in pounds and quarter-pounds, the shoes or boots, cloak, and outer coat being cast off.

Teachers could utilize the material gained in these records in teaching graphs to upper grades, and for simple processes in arithmetic involved in working out the average stature and weight of the class, the standard deviation, &c.

The time taken in weighing need not be great. With weighing-machines having dial and spring balance, weighing is of course very rapid; and a class of fifty, with the teacher taking the heights and weights and an eighth-grade child copying down the names and figures and generally helping as clerical assistant, should not take longer than fifteen minutes. For the ordinary weighing-machine, with loose weights and graduated bar, the following method is best. The time lost is chiefly in juggling with the weights, taking them on and off. The children are therefore first arranged in line, and in order of height—"tallest to the right, shortest to the left." Owing to the fact that height and weight usually correspond, and each increase of 1 in. means an increase of a few pounds only, the manipulation usually is limited to pushing the indicator along the bar a little as fresh children step on, and then the reading is rapidly taken. This greatly simplifies and quickens the procedure. Following the practice in England, we take height without boots, and weight similarly without boots and outer coat or cloak. Most accurate of all would be the before-mentioned weighing during swimming-classes. On the training-ship "John Murray" this practice has been adopted, together with chest and head measurements, at regular intervals, and has been found to be a valuable guide to the whole progress of the boys. It is worthy of adoption generally. Types of weighing-machines are at present being considered; and the cost of instalment of a weighing-machine, owing to its possible use in examination of Junior and Senior Cadets, may perhaps be paid out of the present defence allowance, and would not be more than £3 to £4.

In the medical examination each child is stripped to the waist. The fourth rib-cartilage, at its junction with the sternum or breast-bone, is felt for according to the anthropometric method, and the tape is passed round the chest at this level. The child is told to take a "big breath" and then "to let it right out." The minimum measurement at expiration and the maximum inspiration are noted and recorded in millimetres. The degree of expansion is the difference between these two figures. Certain fallacies, however, may creep in. In older girls (over, say, thirteen) the breast-development often renders this girth-measure misleading as a true indication of the growth of the bony chest. Certain of the more muscular boys in the high schools have learnt to contract violently their shoulder-blade muscles, and by hollowing in the muscles of the abdomen produce together with the bunched muscles a spurious expansion, not truly representing a deep inspiration. This is a well-known Sandow trick. These are avoided by the calliper measurements of the diameters of the chest at the fourth-rib level, antero-posterior (A.P.), or from the breast-bone in front to the tip of the spine behind, and also the lateral (lat.), or from side to side (rib to rib). These points are bony and almost immediately under the skin, so that muscle-contraction or breast-enlargement cannot influence them. They further furnish one with an idea as to the relation of the breadth of the chest to its depth—an index of some importance.

All the children of a school are measured, with the exception of some under eight, many of whom cannot breathe deeply to order, but often respond by holding their breath with the chest in fixed position in an exasperatingly prolonged and persistently repeated effort. The diameters are recorded in millimetres both in the maximum inspiration and in the minimum expiration positions.

Through the kindness of the Victorian Government Statist, Mr. Laughton, assisted by Mr. McDonough, the chest and head measurements of a fair number of children are now available, and are recorded in the tables.

The chest-measurements for some 5,672 children have been analysed according to age and sex, also the head-measurements of 2,663. These children belong to schools in Collingwood or in other metropolitan districts or in country centres, and consist of almost equal numbers of boys and girls. From these a few below five and a half or above fourteen have been omitted, as the numbers are so small as to prevent the possibility of any generalizations. Of the total number of children, 60 per cent. or so are Australians of the second generation (3,377 out of 5,672, and 1,645 out of 2,663).

The analysis of these records has been most carefully carried out by the statists. All doubtful cards were first eliminated; then children were divided into boys and girls; and, again, each of these into six-monthly age-periods—for example, five years and nine months to six years and three months, with a central age of six years. Thus, for each batch of children between six and fourteen years of age we have two main divisions (sex), each with sixteen age-periods, or thirty-two sections in all.

The numbers in each section are therefore somewhat small, but are fairly consistent and valuable as giving probably some approximate idea of the trend of physical development.

With regard to chest-measurements, some irregularities may be suspected where, with increase of age, no corresponding increase in ability to expand the chest occurs, judging from the diametric measures. It is well to remember that, after all, though the breadth and width of the chest in the fourth rib-plane does give an excellent idea of the chest characters, the third dimension of the chest (length) has not been recorded, no satisfactory standard measurement having yet been evolved. So it is possible that this chest-length may, by its increase with growth, occasion this irregular increase in transverse expansion.

A study of the tables of chest-growth reveals interesting points of difference in chest-growth and breathing-expansion in boys and girls. Throughout school life the size of the boy's chest, taken in the position of complete expiration, is slightly larger in both diameters than that of the girl's.

The metropolitan boy's chest, for example, is 165 mm. wide (lat.) and 128 mm. in depth (A.P.); the girl's, 161 and 123 respectively at the age of six years and a half. At the age of fourteen the corresponding measurements in boys are 210 mm. width and 151 mm. depth; in girls, 180 and 148 respectively. It will also be noted that while at six and a half the differences are only a few millimetres, or about $\frac{1}{6}$ in., at fourteen on the other hand, while depth again is much the same in the two, a distinct difference in width manifests itself, the boy's chest being about 20 mm., or $\frac{3}{4}$ in. wider. This difference is apparently part of a difference in chest-development which shows itself in the relatively broader shoulders of the boy and man. It means, too, a relatively flatter chest in the boy and a relatively rounded chest in the girl. This is shown by the chest index (depth divided by width), which is 0·79 in the boy of six and a half, but only 0·72 at fourteen; while in the girl it remains stationary at 0·76 to 0·77.

It may be objected that possible personal errors or the personal equation may explain these divergences, but that these are real divergences is shown by looking at the other measurements of amount of expansion. Whereas in the boy and the girl at six and a half the expansion forwards (20 and 20) are the same, and are identical with the lateral expansion (21 and 21), it will be noticed that the forward chest-expansion in the boy rises from 20 mm. up to 34 mm., while the lateral expansion is almost unaltered—20 mm. to 22 mm. In the girl, on the other hand, while the expansion forwards remains the same from six and a half to fourteen years, the lateral expansion slightly but definitely rises from 21 to 27, exactly the reverse to that of the boy. Such a finding (greatly increased forward expansion in the older boy and slightly increased lateral expansion in the older girl) exactly fits in with the previous findings.

A flat chest typically has its chief movement forwards and backwards, just like an ordinary bellows, while a relatively round chest tends to heave in the flanks like a dog or horse, or like a bellows held on the side; or, to put it in another way, lateral growth is accompanied by increased forward expansion, and *vice versa*.

This difference in growth—the result of the study of five thousand children—has not been pointed out before. Its exact meaning we do not know. It may, seeing that a round chest is more typical of tuberculous disease, explain to some extent the more rapid appearance of phthisis in young girls of about eighteen years, and not in men till rather later in life.

Head-measures, length and breadth, show a slow but definite increase of growth, during the years six to fourteen, of nearly 2 mm. a year in length and nearly 1 mm. in breadth. In boys, they range from 172 and 138 at six and a half to 184 mm. and 144 mm. respectively at fourteen. The relationship of breadth to length (cephalic index) ranges from 0·81 to 0·79, or just on the border-line of the long-headed types (80 and upwards). Girls tend to have slightly smaller heads in both dimensions, and the rate of growth to be slightly slower.

A comparison of metropolitan and country-centre children is difficult at present owing to small numbers. The tendencies seem to be that the country boy's chest is not so wide or deep at six and a half as that of the metropolitan boy; his lateral growth is rather greater, and at fourteen the measurements are very similar. The country girl's chest tends to grow a little wider than her sister's in the town, though still not so wide as that of the country boy. Considering that country boys and girls are 2 in. taller or so, the bony frame of children will be seen to be larger in country than in town.

Metropolitan Schools, 1910.—Chest-measurements.

Ages.	Boys.										Girls.									
	Both Parents born in Australia. Minimum Diameters in Millimetres.					Total of all Children.					Both Parents born in Australia. Minimum Diameters in Millimetres.					Total of all Children.				
	Number of Cards.	A.P.	Diff.	Lat.	Diff.	Number of Cards.	A.P.	Diff.	Lat.	Diff.	Number of Cards.	A.P.	Diff.	Lat.	Diff.	Number of Cards.	A.P.	Diff.	Lat.	Diff.
Yrs. mos. Yrs. mos.																				
5 3 to 5 9 ..	16	125	18	158	19	24	125	20	161	19	11	122	18	153	20	15	122	19	153	20
5 9 ,, 6 3 ..	17	124	22	161	19	24	126	21	160	20	20	123	19	152	18	36	123	20	152	19
6 3 ,, 6 9 ..	21	129	20	165	21	38	128	22	167	20	22	123	20	160	21	39	123	20	161	21
6 9 ,, 7 3 ..	36	127	22	169	19	61	128	22	170	18	22	126	21	163	24	44	124	21	162	23
7 3 ,, 7 9 ..	33	131	22	172	18	57	130	22	171	17	34	120	22	168	20	64	127	21	161	20
7 9 ,, 8 3 ..	35	131	24	179	20	64	131	24	179	18	41	128	22	166	20	60	130	22	168	19
8 3 ,, 8 9 ..	34	130	23	179	19	52	132	24	179	19	31	129	23	167	21	50	128	22	168	19
8 9 ,, 9 3 ..	38	137	26	185	18	60	136	26	184	18	41	132	17	172	18	69	132	19	171	19
9 3 ,, 9 9 ..	25	135	25	186	18	59	135	25	186	18	41	133	17	170	19	59	131	18	170	18
9 9 ,, 10 3 ..	33	136	27	186	20	52	137	27	186	19	32	135	17	165	21	60	134	17	167	21
10 3 ,, 10 9 ..	42	140	20	192	20	66	139	27	191	20	41	135	16	170	21	70	135	16	171	21
10 9 ,, 11 3 ..	37	136	28	192	19	61	138	28	190	20	41	135	16	168	21	77	135	16	170	20
11 3 ,, 11 9 ..	28	144	31	202	19	54	141	30	198	20	40	135	15	173	20	73	136	15	174	21
11 9 ,, 12 3 ..	39	140	30	200	19	62	141	30	198	20	38	137	17	174	23	72	138	16	175	22
12 3 ,, 12 9 ..	23	146	27	197	20	38	145	29	195	20	26	142	17	181	22	50	140	16	179	21
12 9 ,, 13 3 ..	19	144	33	207	20	40	146	32	206	19	31	142	16	178	24	66	147	16	181	24
13 3 ,, 13 9 ..	28	147	32	206	21	47	148	33	206	21	21	148	15	182	23	44	148	15	181	23
13 9 ,, 14 3 ..	11	151	34	210	22	25	151	34	210	22	21	148	18	180	27	44	148	19	184	26
14 3 ,, 14 9 ..	8	148	32	207	20	12	144	33	208	20	15	153	19	190	25	23	156	18	194	26
	523					896					569					1,015				

Country Schools (957 Children).—Ages and Chest-measurements.

Ages.	Boys.										Girls.									
	Both Parents born in Australia.					Total Children.					Both Parents born in Australia.					Total Children.				
	Number of Children.	A.P.	Diff.	Lat.	Diff.	Number of Children.	A.P.	Diff.	Lat.	Diff.	Number of Children.	A.P.	Diff.	Lat.	Diff.	Number of Children.	A.P.	Diff.	Lat.	Diff.
Yrs. mos. Yrs. mos.																				
6 3 to 6 9 ..	5	128	15	157	19	7	130	16	159	19	2	120	20	161	20	5	128	18	157	15
6 9 ,, 7 3 ..	5	126	19	175	14	10	128	17	169	15	4	131	13	165	18	6	127	14	164	16
7 3 ,, 7 9 ..	13	130	15	162	16	19	131	15	163	16	11	126	14	163	15	12	126	14	163	16
7 9 ,, 8 3 ..	13	132	14	175	16	16	133	14	175	16	21	125	17	166	17	23	125	18	166	18
8 3 ,, 8 9 ..	7	130	22	176	17	10	133	26	178	16	11	125	16	161	17	17	126	16	163	17
8 9 ,, 9 3 ..	14	131	24	181	21	17	133	23	180	20	29	128	18	168	18	34	125	19	167	18
9 3 ,, 9 9 ..	15	137	23	179	19	19	137	22	180	20	17	130	21	167	19	22	130	21	165	20
9 9 ,, 10 3 ..	22	140	25	188	19	26	140	23	187	19	13	129	20	172	18	20	130	19	175	18
10 3 ,, 10 9 ..	19	138	27	195	21	30	139	26	194	21	17	129	19	174	20	22	130	18	174	19
10 9 ,, 11 3 ..	25	144	27	193	20	31	144	27	193	21	18	123	20	170	16	29	126	20	174	18
11 3 ,, 11 9 ..	21	137	31	200	20	37	139	30	200	20	19	135	20	181	18	28	138	18	182	18
11 9 ,, 12 3 ..	26	143	28	197	19	45	144	28	199	19	30	140	22	182	21	42	138	21	182	21
12 3 ,, 12 9 ..	37	147	29	204	20	54	146	29	204	20	26	137	21	189	20	41	138	20	189	19
12 9 ,, 13 3 ..	53	149	30	208	19	78	149	30	206	19	38	142	21	187	21	59	144	21	190	21
13 3 ,, 13 9 ..	42	147	32	207	20	53	148	32	208	20	39	141	25	197	22	51	141	24	197	22
13 9 ,, 14 3 ..	22	149	30	209	21	39	149	31	209	21	20	144	22	195	23	35	145	21	198	20
	339					491					315					446				

Metropolitan Schools (1,733 Children).—Ages, Combined with Cranial (Head) Measurements, of School-children.

Ages.	Boys.						Girls.					
	Both Parents born in Australia.			Total.			Both Parents born in Australia.			Total.		
	Number of Children.	Length.	Breadth.	Number of Children.	Length.	Breadth.	Number of Children.	Length.	Breadth.	Number of Children.	Length.	Breadth.
Yrs. mos. Yrs. mos.												
6 3 to 6 9	11	172	138	20	172	138	11	168	137	18	170	139
6 9 ,, 7 3	9	179	141	21	180	142	13	173	138	19	174	138
7 3 ,, 7 9	15	178	140	28	178	140	12	171	140	18	173	140
7 9 ,, 8 3	18	180	142	34	179	141	23	176	139	39	176	139
8 3 ,, 8 9	29	180	144	44	179	144	25	173	137	31	174	138
8 9 ,, 9 3	32	179	142	50	180	142	36	174	140	42	175	140
9 3 ,, 9 9	22	180	144	38	180	142	21	176	142	38	176	142
9 9 ,, 10 3	34	179	141	51	180	142	28	178	140	54	177	140
10 3 ,, 10 9	34	180	144	55	180	144	30	177	141	51	177	141
10 9 ,, 11 3	35	182	144	57	181	144	30	178	143	65	177	142
11 3 ,, 11 9	34	182	144	57	182	144	31	179	142	64	179	142
11 9 ,, 12 3	33	183	143	64	182	143	41	178	141	80	179	142
12 3 ,, 12 9	73	182	144	117	182	143	67	179	142	111	179	142
12 9 ,, 13 3	50	182	144	108	182	144	59	180	142	105	179	142
13 3 ,, 13 9	88	183	144	143	183	144	45	180	143	83	180	143
13 9 ,, 14 3	42	184	144	75	184	145	31	181	143	53	180	142
	559			962			503			871		

THE PROTECTION OF THE PUBLIC HEALTH, FROM THE MICRO-BIOLOGICAL ASPECT.

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The part played by local bodies in the protection of the public health is at the present day of great importance. Whilst a central whole-time administration must be looked upon as the organizing and controlling body engaged in the protection of the public health on broad lines, to the local bodies must be left to a very great extent the minuter details of the work so essential to render effective the efforts of the central body. In addition, local bodies are of very great importance in bringing home to the individuals of the community the fact that the maintenance of the health of the people at large is essentially dependent upon the right action of each individual. If families are to remain free from epidemic and other diseases due to the social habits of man, then each member of such family must act up to the higher ideals put forward by health authorities, and must use his influence to see that his neighbours live similarly to himself. The local body therefore, in a way, represents on the one hand a means of execution of the principles indicated by the central body, and on the other hand a banding-together of the individuals of the community to maintain amongst themselves the higher standards of health.

The wish has been expressed by certain local bodies in New Zealand that at this Congress information should be made available as to the various methods in vogue adopted in various places for maintaining the health of the public. The object of such a request is undoubtedly to obtain data as to the most efficient and most economical ways of safeguarding the health of the community. The economy which they seek is not that false one of cutting down all expenses, wise or unwise, but of that far-seeing type which recognizes that the judicious expenditure of money in certain directions will be repaid many times over in the results achieved. I propose in the following short paper to outline briefly from the bacteriological and epidemiological point of view, more tersely described under the term "micro-biological," in what ways it seems to me such economy combined with efficiency will give the best returns.

The diseases the public-health authorities have mostly to cope with, and which lead to the greatest financial loss to the community, are those due to infective organisms of various kinds. To a great extent the disastrous results dependent upon these diseases are directly attributable to the social habits of the human race. It is perfectly obvious that in ancient times, when savage peoples consisted of nomadic families, each one keeping to a great extent entirely to itself, the chance of disease organisms spreading amongst the scattered community was small. As time went on, and villages and finally towns arose amongst the sparse population, the propinquity of individuals thereby induced led to the more frequent conveyance of disease-producing organisms from one to another. Such ease of conveyance alone would tend, by giving ampler opportunities of infection, to convert originally comparatively harmless organisms in course of time into forms more directly injurious to health. Now, in our crowded cities, with perhaps half to a few million people closely herded together, and working, especially in factories, in dense masses, the conveyance of germs by mere propinquity is a matter of the greatest ease. The recent outbreak of smallpox in New Zealand and in New South Wales in a form which was certainly not so highly infectious as the virulent smallpox of the Far East well illustrates this fact. The spread of an ordinary cold in the head, of measles, and of influenza is notorious, and is to a great extent dependent upon the crowding-together of individuals facilitating the means of spread. Diphtheria likewise may run through the community, and the detection of the numerous carrier cases illustrates how widely, in the face of an epidemic, an organism may be distributed, though fortunately every case thus infected with the organism does not necessarily develop the disease, though acting as a further factor for dissemination. It may therefore be taken as a canon in epidemiology that the massing-together of the community, especially in the presence of epidemic disease, is as far as possible to be prevented, and that when such crowding is necessary the resulting evils as far as possible must be eliminated. By this is not meant, of course, that every school or every factory should be shut up; that the trains should not run; or the tram-cars stand still—it means that unnecessary concourses of people should not take place, and that strict measures should be adopted to prevent all those who may be considered in any way as distributors of the organisms of disease from frequenting especially those places where a number of people are closely grouped together, as, for instance, in railway-carriages and tram-cars, and at public meetings, theatres, and picture-shows. It means that in factories and schools the freest ventilation must be established, that sunlight must be given due ingress, that dust must be kept down, that undue humidity combined with warmth must be eliminated. It means that in such places no common possible vehicle of infection must exist, such as towels or drinking-vessels usable by any one. It is unnecessary to dwell upon other aspects with which such communities may protect themselves against infection, save to impress the fact that each individual concerned must keep himself in the best of health by living a plain and simple life, and that his working arena must be such as to stimulate rather than depress his vital activities. Work, for instance, in a close, warm, muggy atmosphere quickly leads to fatigue and a greater liability to contract infection, whilst if this same air is kept circulating by means of fans or some similar contrivance the stimuli thereby applied by the moving air to the skin tend to regulate the body processes and diminish fatigue.

In coming to the more bacteriological aspect of the question before us it may first of all be pointed out that local bodies may diminish the incidence of infectious diseases in three ways: Firstly, by protecting the public from contracting the disease, either by preventing such disease from reaching the community at all, as is the case usually with smallpox, by protective inoculation as against typhoid fever, or by so controlling the avenues by which infection may be conveyed that even in the presence of the disease the individual may remain unscathed. Secondly, the local body may help to prevent the spread of disease by affording facilities for the ready identification of the nature of the disease, such as by bacteriological and other means. Thirdly, the local body may prevent further extension of the disease, and help in the cure of those affected, by isolating or otherwise seeing that the individuals are properly looked after and are no longer a source of danger to others.

Having indicated that these three channels of protecting the public exist, it will simplify matters if they are now dealt with together from the point of view of the bacteriologist and epidemiologist. It may here be pointed out that any efficient and economical control of infectious diseases is now dependent upon the assistance granted by bacteriological laboratories; and, though such institutions are expensive and require a generous upkeep, their importance to the community is so great that if their cost were ten times greater it should be cheerfully borne. Every local body must by some means or other have ready access to the advice and investigational facilities of a properly equipped and staffed bacteriological laboratory. In most cases it will be sufficient if such facilities are supplied by the central authority. In out-of-the-way places, however, it may be necessary for a group of local bodies to combine amongst themselves for the establishment of these facilities in their midst. It may be pointed out here that it is to the micro-biologists—to the men who have studied bacteria and protozoa, their ways of growth and their habits of life—that most of our present means of protecting the health of the public are due. On the discoveries made by them, on the facts and data they have collected, the public-health administrator bases his actions.

The bacteriologist of repute is of a different order to the hygienist. The latter is the administrator of health laws and the adviser in general measures, whilst the former is specially trained in the detection of disease-producing organisms, and to study their modes of spread, and to advise as to their control. The present-day experience shows that in the protection of the public health both these co-equal workers are absolutely essential, and that in the investigation of any epidemic diseases the field of work must be open to both. I desire most emphatically to impress at this point the principle that the establishment of such a properly equipped and staffed bacteriological laboratory is absolutely essential in any public-health administration, and that the staff of such a department must have every inducement offered to it to induce the best members of the profession to enter its ranks. The work carried out by it should be independent of ordinary public-health administration, so that the full time of its members may be devoted to the study of the identification, spread, and control of disease-producing organisms. Such laboratory facilities having been obtained by the local body, and a thoroughly qualified staff being available for consultation and advice with the officers of the local body, along what lines should the local body especially seek for help? This may be best discussed under the individual diseases concerned.

Diphtheria.

The correct diagnosis of suspected cases of diphtheria, and the detection of carrier cases in the face of an epidemic, should naturally be of great importance. In any large community cases of diphtheria occur at irregular intervals throughout the year. After varying periods of comparative quiescence epidemics break out, and may spread almost throughout the world. Such a pandemic has existed in Australia for the past few years. The work performed by the laboratory for the Health authority may be discussed under the headings—(*a*) In the absence of an epidemic; and (*b*) in the presence of an epidemic.

(a.) In the Absence of an Epidemic.

The Health authority must see that means are available for the rapid examination of swabbings from medical men. The early diagnosis of cases of diphtheria is of importance in enabling measures to be taken to prevent the spread of the disease and the infection of carriers. Whenever the medical man has the least suspicion that the patient's illness may be due to diphtheria a swabbing should be taken to decide the point. If the medical man has to pay for the examination of this swabbing out of his own pocket, or has afterwards to collect the fee from the patient, it is naturally a deterrent to activity in this direction. In the case of an infectious disease like diphtheria the Health authorities should agree to have the examinations done in the laboratory free of charge, and every inducement should be offered to medical men to forward swabbings. Swabbings should also be taken from other members of the household besides the patient, and from any person likely to be infected from the endemic cases, so as to limit the means of spread by detecting harbourers of the bacilli.

(b.) In the Presence of an Epidemic.

Here marked activity is required on the part of the Health authority and the laboratory. It may be necessary to examine large numbers of individuals, more especially school-children, so as to detect the presence of carriers. In the face of an epidemic the number of carriers in various classes of the community may be very large. In country schools we have met with instances in which nearly 30 per cent. of the children were carriers in one district; whilst in another district where the disease had only been just introduced the number of carrier cases was only 1 or 2 per cent. In the latter case activity in the detection and isolation of carrier cases may limit the spread of the disease in the district; and even in the former case, though the spread of the disease might perhaps not be now capable of control, still the information obtained as to carrier cases may prove of the greatest service to the Health authorities. Parents can be warned of the fact of any one of their children being such a carrier case, and of the danger of such a child to others, and can also be put upon their guard so that on the first onset of symptoms of sore throat or any other signs of the disease in other members of the family, resource can at once be made to the doctor and antitoxin administered.

The problem of carrier cases is one of the most difficult in modern epidemiology. Our recent experience has indicated to us that carrier cases, once firmly established as such, may persist as carriers for long periods of time, embracing many months. The organism may apparently disappear from the throat, and three or four negative results may be obtained, yet with a change of weather, such as rain or damp, or from some unknown cause, the organisms may again appear. A carrier case, therefore, once diagnosed must still be regarded with suspicion even when apparently bacteriologically harmless. It is probable that all carrier cases are not equally dangerous to the community, but the difficulty is to know which are apparently innocuous and which are dangerous. There seems no reliable test for deciding this, for even if the organism be found of a non-virulent type we do not know whether on passage to another individual virulence may not be restored. Probably the right course to pursue is to have authority under a Public Health Act to, if necessary, isolate not only those persons actually suffering from the notifiable disease, but those whom there is reason to suspect (*e.g.*, as by bacteriological examination) are distributors of the disease-producing organism. Such authority for isolation being available, the parents or the individual found to be the carrier can be warned of the danger to others, and directed how to diminish the risks to others dependent upon his condition. If there is evidence that the directions given are as far as possible carried out, then isolation need not be insisted upon, but if the patient or his parents are fractious it may be necessary to enforce such powers.

In the face of any epidemic the Health Officer and a bacteriologist should work in conjunction on behalf of the Health authority. Notification of actual cases of the disease will be received by the Health Officer, who will then have an indication as to where to look for carrier cases. Most likely the indications will point most particularly to schools. The Health Officer will either take himself, or will direct a specially trained nurse to take under his directions, swabbings from the throats of such individuals as seem most likely to have been exposed to infection—in the case of schools, if possible every child in attendance. The bacteriologist will examine these swabbings, and will furnish a preliminary report in twenty-four hours and a final report in forty-eight hours. The carrier cases will then be known, and the measures above mentioned taken to prevent danger from these.

As regards the supply of antitoxin in the event of epidemics of diphtheria, I am of opinion that the best course to pursue where medical facilities are easily available is to withhold administration of the antitoxin until there is clinical evidence indicative of the establishment of the disease. If in a school or community the wholesale administration of antitoxin is adopted as a preventive against the actual disease, the cost to the community will be large and the benefits to the individuals perhaps not as great as may have been anticipated. The antitoxin is only an antidote to the poison produced by the bacillus, and does not interfere with the actual growth of the bacillus itself in the throat. Consequently, many persons may have received a dose of antitoxin and yet later become infected by the bacillus, though without showing any signs of the disease. Though protected themselves against the illness they may still act as carriers. Moreover, the protection afforded by the antitoxin is transitory, and if the epidemic is a prolonged one the effects may have passed off before it is ended. Should the patient at this stage develop the disease there is some slight risk of unpleasant symptoms supervening, owing to his having had previously a dose of antitoxin. I think it a better plan to make it generally known to the community affected that should any member have the slightest evidence of sore throat or other symptoms of diphtheria he should at once consult a medical man. If the medical man sees any indication that the case is really diphtheria he should then administer the antitoxin, which in the case of poor patients should be paid for by the Health authority, and not out of the doctor's own pocket. If the community is on its guard for the detection of sore throats due to the diphtheria bacillus, and if the population is not a very scattered one so that medical services can be obtained within an hour or so of such manifestations of disease, then I think the administration of the antitoxin purely as a prophylactic is not necessary. The matter is somewhat different, however, in the case of a widely scattered population, amongst which diphtheria has become epidemic. Here under certain circumstances it may be advisable to protect small isolated units by antitoxin if far removed from a doctor. The administration of antitoxin to other members in an infected household is a matter best left to the judgment of the medical men concerned. To prevent loss of life due to the epidemic it is essential that the Health body make available a sufficient supply of antitoxin.

Tuberculosis.

The duty of the Health body as regards the detection of cases of tuberculosis by bacteriological means is clear. They must offer every inducement to medical men to forward the sputa from suspicious cases for examination for tubercle bacilli. No charge should be made for such examinations. They should also offer to examine free of charge sputa from other members of the household from which the patient came. If the patient is found to harbour tubercle bacilli he must be informed of the fact, and clearly warned of the danger of carelessness on his part. With proper care a consumptive harbouring but few tubercle bacilli in his sputum may be of practically no danger to other members of the community. If he is careless and spits indiscriminately he may infect others, especially in his own house. Children crawling on the floors are especially likely to get infected in this way. The advice of the bacteriologist may be sought in some instances to show whether the surroundings in such cases are infected, such as the dust on shelves, &c. When the bacteriologist finds that considerable numbers of tubercle bacilli are present in the sputum, it is obvious that however much care is taken the individual must still remain a grave source of danger to others. Under these circumstances, which the bacteriologist should specially notify to the Health body, it may be necessary to insist upon the patient being cared for in some properly constituted sanatorium.

Typhoid Fever.

The bacteriologist can play a very important role in the control of this disease. He should be called upon by the Health body to investigate any instances in which small epidemics of typhoid fever occur periodically in any small community or part of the community. The special object of asking for his services is in the detection of carrier cases, who may harbour the bacilli for long periods of time. In conjunction with the Medical Officer of Health he should discuss all the data available, so as to obtain if possible indications in which direction to search for such carrier cases. Most probably the carrier will be associated in some way with the preparation of food. As the bacteriological examination for the detection of typhoid bacilli in such carriers is a matter requiring much time and trouble, it is necessary for him to reduce as much as possible the material he has to examine. Therefore the more searching the investigation as to the likely source of the disease from the history of the cases, the less material he has to examine, and the better chance he has therefore of speedily detecting the carrier case.

His services, however, will be required not only for the detection of the carrier cases, but to ascertain the means of conveyance of the organisms from the excreta of the carrier to other people. He will have to ascertain whether the carrier directly infects food, or whether flies play a part in the process. He must search the sanitary arrangements and see what kind of flies, if any, can gain access to the infected excreta.

As it is essential that actual cases of the disease should be recognized as early as possible, facilities must be offered to medical men in making their diagnosis certain. One of the best methods for the early detection of the presence of typhoid fever is by means of cultures taken from the blood ; at a later stage the well-known Widal's reaction can be obtained. Examinations of both these kinds should be made by the laboratory for medical men without charge. Wherever possible, before a case of typhoid fever is discharged from a hospital his faeces and urine should be examined to ascertain his freedom or otherwise from typhoid bacilli.

Statistics from various parts of the world seem to indicate clearly that protection can be afforded to a community for two or three years against typhoid fever, by the protective inoculation of vaccines prepared from the typhoid bacillus. It is advisable that nurses and others likely to be exposed to infection should be regularly protected in this way. Where any endemic focus exists similar protection is advisable, whilst in the face of an epidemic this may be the surest means of preventing the spread. The bacteriological laboratory must be prepared to supply at short notice large amounts of typhoid vaccines.

Venereal Diseases.

The question of the control of these diseases has received great prominence of late. Whatever view one may take as to the best means of control, this at least stands out pre-eminently: that cases must be diagnosed by laboratory methods as quickly as possible, so that medical men may get guidance as to treatment and the patient may be advised as to the danger to others. Attention is necessarily more especially centred on that far-reaching disease, syphilis, which may entail so much misery on innocent persons. During the last few years the Wassermann test—a highly complicated technical procedure—has been found of the utmost value in diagnosing cases, especially doubtful ones ; in indicating the likelihood or otherwise of the continuance of infection after treatment ; and in showing what obscure diseases of later origin are, or are not, directly associated with the causative organism. It is in the interests of a large section of the community that the laboratory should give facilities to medical men to ascertain the presence of this disease or otherwise in their patients, and the effects of treatment. The application of this test to individuals of the criminal population who are under restraint, and in whom there are indications suggestive of the disease, is one that may be of great benefit in controlling the spread. Means which prevent such persons from being set at large whilst still infective must be of considerable service to the community. The laboratory should therefore be available for the application of the

Wassermann test, as well as for more direct examination of material from suspected venereal cases. Probably here again it is a matter of real economy to make no charge for such examinations, so as to induce medical men to use to the uttermost the facilities afforded.

In the foregoing the control of the most important microbic diseases by laboratory means has been briefly indicated. There are numerous other diseases in which its services, both from the preventive and the curative aspects, may prove of the utmost value—plague is an instance in point. The diagnosis, at any rate of the first few cases, almost entirely depends upon the bacteriologist's opinion. The laboratory should also systematically undertake the routine examination of rats, which should be forwarded daily by the Health authority for examination. In this way the danger of an unexpected outbreak of plague in man may be forestalled by its early detection in rats, and protective forces thereupon brought into play to prevent the spread to man.

Cases of food-poisoning will require detailed investigation by the bacteriologist.

The laboratory must be on the look-out for the introduction of larger parasites than the bacteria—as, for instance, the eggs of the hookworm, which produce such a severe anaemia and ill health in various parts of the world, and what is known as the " dirt-eating disease."

In addition, the laboratory will offer facilities for the examination of material from individual cases, in which the good of the community is indirectly served by the more rapid restoration to health and activity of its individual units. This may be achieved either by the more accurate identification of the disease, so that proper remedies can be applied, or by the direct curtailment of the length of illness, as by the preparation and use of vaccines in conditions due to various germs.

The Milk-supply.

Amongst foodstuffs milk is one of the most important. Unfortunately it is not only an excellent food for man, and especially for infants, but it is also a fertile culture-medium for the growth of germs which rapidly and profoundly alter it. It is essential that it should reach the consumer in a condition as little altered as possible after its withdrawal from the cow. The alterations which may occur may be due to the introduction of dirt of various kinds, to the multiplication of bacteria, and to the changes brought about in the milk itself by these bacteria. The dairy and its surroundings must be scrupulously clean ; cowdung and dust must be prevented from gaining entrance to the milk. The laboratory, by appropriate measures, can easily ascertain the freedom or otherwise of milk from such foreign matter. When milk leaves the udder of a healthy cow it contains very few organisms indeed, and those of a harmless nature. From the outside of the udder of the cow, from the sides of the cow, from dust, from the splashes of cowdung, from the hands of dirty milkers—large additions of bacteria may easily gain ingress. The Health authority wisely sees that the cow is brushed down before being milked ; that the hands of the milker and the udder of the cow are well washed with warm boiled water ; that the tail of the cow is tied during milking, so as not to be switched into the milk ; that cowdung is received in such a way, if deposited during milking, that its splashes do not enter the bucket ; and that the surroundings of the milking-sheds are as far as possible free from dust. Further, the question of the number of bacteria present in the milk when it reaches the consumer is dependent not only on the number of germs which have gained entrance into the milk, but also upon the length of time during which they have been there, and the temperature of the milk. If milk can be kept cool, at a temperature, say, of not more than 40° F., the multiplication of germs is very small. It is therefore essential that milk after it leaves the cow should be kept as near this temperature as possible, and that it should be delivered to the customer as quickly as possible.

To see whether these requirements have been efficiently carried out, the bacteriologist can prove of the greatest service. By ascertaining the number of bacteria present in the milk when received or during transit, and the kinds of germs present, he can show whether all reasonable methods of care have been adopted. He should systematically take samples of milk supplied by various dairies, and if the count is found by him to be at all high the Health authority should look fully into the circumstances surrounding the supply of such milk.

I think I have shown in the above short *résumé* the importance of a properly constituted micro-biological laboratory in the protection of the public health, and the valuable assistance it may prove to the Health authority, general or local, in the prevention of disease or its curtailment. Only the more outstanding features have necessarily been dealt with, but there are in addition innumerable minor matters in which the knowledge of its staff and the technical means at its disposal will prove of the greatest service.

In conclusion, let me say that the personnel of its officers is all-essential. Obtain first-rate men of ability who can soar above the routine, and, having obtained them, pay them well; parsimony in this respect spells ultimate failure. Further, be generous to the equipment.

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